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ORIGINAL COMMUNICATIONS.

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LARYNGECTOMY FOR CANCER.*

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The status of laryngectomy for cancer is dependent upon the practical answer to three questions, viz.: 1. Is cancer of the larynx curable by laryngectomy? 2. What is the risk? 3. What is the extent of disability of the laryngectomized patient?

1. Discussing the first question we may say that early cancer of the larynx is perhaps the most curable cancer of the body, because: (a) Intrinsic cancer contained within a hyaline cartilage box whose walls cannot be invaded by the cancer cells is in a unique position for the removal with certainty of every cancer cell. (b) There is scarcely another cancer whose diagnosis may be made so early—because from its very beginning the probability of its presence is announced by the hoarse voice of every spoken word. (c) Unlike cancers of the many other parts of the body intrinsic cancer has but feeble powers of invading the lymphatic glands.

Intrinsic laryngeal cancer then exists in a safe deposit box, constantly announces its presence, and has but feeble power of invasion or metastasis. We may therefore conclude that intrinsic cancer of the larynx is curable by excision.

2. What is the surgical risk? I have performed twenty-four laryngectomies for cancer with two operative fatalities, one with mediastinal abscess, the other with necrosis of the trachea with consequent septic pneumonia. This makes a seven plus per cent mortality.

*Read at the meeting of the American Academy of Ophthalmology and Oto-Laryngology, Niagara Falls, October 20, 1912.

Increasing experience in this as in other surgical operations should further diminish this mortality. This mortality compares favorably with the established operations of excision of the tongue, of the stomach and of the rectum for cancer.

3. What is the disability of the laryngectomized patient? The principal supposed disability relates to speech, to personal appearance, and to predisposition to pulmonary diseases and accidents.

As to speech. All patients acquire a buccal whisper which serves the purpose of speech remarkably well. For example, one of my patients is at the head of a large industrial corporation, another a judge, another a foreman in a public works department, another became a popular barber, still another is managing a small coal sales agency, one housewife apparently gets on well enough, and a farmer managed his flocks and his teams in silence. While the speech defect is great, the development of the buccal whisper, the extension of gestures and other forms of natural language and the adaptation of those individuals in daily contact with the patient compensate to a remarkable degree for the speech defect. I therefore do not advise prethetic speech apparatus.

The disfigurement, too, is well covered by the wearing of various kinds of cravats in such manner as to give free breathing and avoid the sibilant sounds of the exchanging air-currents.

As to predisposition to accident and disease, there has been to my knowledge no instance of a foreign body in the respiratory tract nor of pneumonia among any recovered patients whose total number of laryngectomized years is approximately 72. Not only have my patients not showed any tendency to pneumonia and bronchitis, but they have shown a remarkable immunity to nasal colds. We conclude, therefore, that the disability is considerable but is fairly well compensated.

Passing to the technic, we are confronted by the real difficulties to be overcome. These are: 1. The inhalation of blood and pus; 2. local infection; 3. mediastinal abscess; 4. vagitis; 5. shock and collapse due to injury of the laryngeal nerves; 6. canulae; 7. anesthesia. These points will be discussed in connection with the illustrations.

EXTERNAL OPERATIONS ON THE LARYNX, PHARYNX, UPPER ESOPHAGUS AND TRACHEA. SPECIAL DIFFICULTIES AND DANGERS.

A. *Pneumonia*:—Pneumonia following operations on the upper-air passages is due in most instances to two causes, first, the inhalation of blood; second, the inhalation of infected wound discharges. The injurious inhalation of blood usually occurs in the course of

the operation, sometimes it is the post-operative oozing that is inhaled. We now have methods by which the inhalation of blood in injurious amounts can be prevented both during and after the operation. This may be accomplished in three principal ways:

1. By scrupulously maintaining a dry field in the entire course of the dissection. This is done by picking up every vessel that is large enough to be considered at all either before dividing it or the moment it has been divided. In this manner the field will be kept so clear of blood that it will be always translucent, permitting the recognition and identification of all anatomical structures. Then in the interest of a dry and free field during the later stages of the dissection the vessels picked up may be ligated with either light catgut or light silk. This type of dissection would at first thought seem to be tedious, but in the end it will prove to be the quickest method.

This then is the method of choice in the dissection for the exposure of the larynx, pharynx, trachea, or esophagus. When the field of operation has been reached and the preliminary dissection completed, the prevention of the inhalation of blood now becomes a wholly different problem, because the blood supply of the mucous membrane consists largely of terminal arterioles which cannot be effectively controlled by ligation. One of two courses are now open.

2. The patient may be placed in a head-down inclined posture of such an angle that the blood will gravitate away from the lung.

3. By the use of novocain and adrenalin, the trachea, the larynx, and the pharynx may be entered without causing coughing and without material oozing. The local anesthesia of the mucous membrane will permit the local application of pledgets of cotton held firmly in the jaws of hemostat forceps and pressed against the bleeding points. This usually controls the bleeding. The further control of the hemorrhage depends on circumstances. If conditions permit, a rubber tube that will snugly fill the trachea and even distend it will, of course, entirely control the blood inhalation factor. This is an important point which will be especially considered in connection with laryngectomy later on.

Discussion: There are relatively both advantages and disadvantages in the control by posture and the control by technic. In the control by posture the amount of hemorrhage is increased by gravity; this is especially true of venous hemorrhage. Then, too, the head-down position is not so favorable for the operator, both as to light and accessibility. The direct control method has the advantage of light, accessible position and minimum of bleeding. In my experience I have rarely found it necessary to resort to the head-

down posture. Occasionally during a phase of an operation this posture is temporarily used. And occasionally in a great emergency there may exist a combination of circumstances that would urgently demand the head-down posture. Such emergencies will be later mentioned.

It is to be remembered that it is virtually never a question of a risk of death from bleeding alone as in operations on the tonsils or the posterior nares.

B. *Local Infection*:—The next special difficulty associated with these operations is local infection. It occasionally occurs on opening the air-passages or the upper digestive tube that a serious local infection spreads over the contiguous territory and along the deep planes of the neck.

In the first place, the occurrence of infection is taken for granted. It is left to us to consider what, if anything, can be done to diminish the amount and the virulence of the infection and what can be done to localize it. In the first place, the virulence and the intensity under some circumstances can be materially minimized by recognizing the fact that the oral cavity, the pharynx, tonsils or nares may have at the time of operation active foci of infection such as decayed teeth, pyorrhea, alveolar abscesses, discharging sinuses, peri-tonsillar abscess, pharyngitis, purulent rhinitis. All of the contiguous territories should be canvassed and when possible, put to right if at fault. Then again, the local severity of the infection may be measurably controlled by using only sharp dissections and minimizing to the uttermost the trauma to the surrounding tissue; by leaving no oozing of blood; by carefully weighing before decision, the question of immediate closures of the soft parts overlying the wound, and lastly, by using iodoform packing if there is to be any wound in the soft parts of the throat and neck. I have yet to find a substitute for the disagreeable iodoform gauze. When infection has been inaugurated, nothing perhaps does so well as the hot pack and the inhalation of medicated or plain steam. This brings us to the third special difficulty and danger peculiar to operations on this region and that is

C. *Mediastinal Abscess*:—Especially in laryngectomy, mediastinitis and mediastinal abscess has extracted a heavy toll of life. The onset of this infection is usually a week or ten days after the operation. It is characterized by a steeple-chase temperature, not high, but always remitting in the morning. There is usually but little pain and the course of the disease is toward slow but certain death. In many respects it resembles the retro-peritoneal abscesses

which also come late and are almost painless, progress slowly, show a steeple-chase, though low, curve, many cases ending in death. The explanation of the characteristic, painless, tedious and fatal course is probably the following: this region of the body has been protected by the bony chest wall from wounds, hence during infections through the vast period of evolution, the tissue of this protected region has not been endowed with the elements required to efficiently meet and overcome infection—as, for example, is done by the peritoneum and by the external parts of the body.

In view of these facts, we must guard with scrupulous care this helpless territory. How can this be done? If in the course of the operation for laryngectomy, for instance, the divided trachea is stitched to the skin, it will likely, owing to the subsequent coughing, detach itself and having lost its moorings it will be thrust back and forth, in and out, of the thoracic box like the piston of an engine. The result—the almost inevitable result—is mediastinal infection by the piston-like movement of the trachea. The remainder of the story need not be recited. If, on the other hand, the free end of the trachea is not fixed by sutures but held as well as possible by gauze packing about it, the trachea will retract within the thoracic cage like the head of a turtle. The retraction is due to the property of elasticity possessed by the trachea.

It is obvious that the trachea should be fixed by granulations, by a preliminary operation. There are two types of preliminary operations, one is the ordinary low tracheotomy, the other is the exposure of the trachea, the lower larynx and the lateral planes of the neck into which iodoform gauze is packed. In about five days there will be produced an invincible barrier of granulations—full of defenses against infection extending across the base of the neck and entrance to the thoracic cage. In addition, the trachea will be fixed in the neck so firmly by the granulations that coughing will not break its moorings. Simple tracheotomy will also fix the trachea and will also stimulate the formation of efficient granulation tissue.

Discussion: Each of these methods of pre-operative protection has certain advantages and disadvantages. The simple tracheotomy is not so certain a safeguard against infection of the mediastinum and the trachea is not quite so firmly fixed in the deeper part of the neck but has the advantage of establishing a strong defense-mechanism in the mucous membrane of the trachea itself as well. The packing of the deep planes of the neck with iodoform supplies no protective defenses in the mucous membrane of the trachea but otherwise it makes an ideal pre-operative protection. The ideal is

to open and pack the deep planes of the base of the neck and at the same seance make a low tracheotomy. This will put the mediastinum and the pulmonary tract under strong guard, and at the same time reduce the later technic of laryngectomy.

D. *Vagitis*:—This is a less frequent, though formidable special risk.

In the course of the convalescence following laryngectomy, usually after the fourth day, there is occasionally introduced a group of new symptoms, the pulse becomes very rapid, irregular in rate and rhythm—it may jump from 90 to 140 in a few minutes—the heart's action is tumultuous at times and the patient is quiet, though perhaps a little apprehensive. In my own cases the symptoms cleared up after a rather boisterous course of a few days. Death from vagitis has been reported. It is likely that the trunks of the vagi have become involved in the wound infection and as a result these nerves have been rendered unfit to properly conduct stimuli. Hence there arises the striking alternation between the vagus and the accelerator control, the picture is very similar to the immediate effect of crushing or of dividing both vagi simultaneously. As a protection against this, one might utilize the well-known physiologic fact that the division of one vagus causes no notable change in the heart's action. In the course of massive dissections for wide excision of cancer of the neck I have eight times excised a portion of the trunk of one vagus. Close observation of the pulse and respiration detected no change. Neither was there any later change observed.

On this lead, at the preliminary operation one should carry the dissection alongside of the larynx of one side all the way to the upper margin of the field of final operation and pack this territory with iodoform gauze the same as one packs the deep planes of the neck, and so let one vagus take the brunt of exposure and adjustment before the larynx is removed. By the time the laryngectomy is done, the first vagus would be likely to resume its function should it have been affected, or at any rate the heavy onslaught of the vagi upon the heart would not be made by both vagi simultaneously. Although I have had no opportunity of testing this point clinically, yet from observation on dogs, this plan would seem to be adequate to obviate the danger of vagitis. When vagitis has been established there is but little that can be done to alleviate it. Thus far, hot applications apparently were of service.

E. *Reflex Inhibition of the Heart and Respiration Through Mechanical Stimulation of the Superior Laryngeal Nerves*:—Though this is a minor phenomena, peculiar to surgery of this re-

gion, it has caused those who were not aware of its existence and who knew not how to obviate it or interpret it, much anxiety and trouble and several deaths. The terminals of the superior laryngeal in the larynx and on the surface of the rima glottidis are of necessity disturbed and their trunks are divided in the course of operation.

The slightest touch of the endings of the nerve whose function is that of guarding zealously the entrance of foreign bodies into the pulmonary tract causes a cough reflex and if the contact be a little stronger it will cause an inhibition of respiration and of the heart. The nerve-supply of the trachea has no such function, i. e., of inhibition of the respiration and of the heart. The area of distribution of these inhibitory nerve-endings extend over a part of the pharynx and even a part of the posterior nares.

Now, fortunately, there is an absolute protection against this dramatic and sometimes dangerous phenomenon and that is the administration of a hypodermic of atropin 1-100 grain for an adult before the operation. In addition, a spray or a local application or a local hypodermic injection of novocain also absolutely controls the inhibitory reflexes. Another special difficulty occurring in the after-care relates to the type of tracheal canula and their special care.

Canulae: After trying many kinds of canulae I found that the commonly used male and female curved canula or plain rubber tubing answer all purposes. It is a most important point to exercise the greatest care in the early adjustment of the metal tubes not to cause a decubitis on the posterior wall of the trachea. Rubber tubing is preferred by some patients, but the metal tubes usually answer better. A rubber tube drain over a metal tube is perhaps the easiest worn, but I found that patients become careless with familiarity with danger and will wear loose-fitting tubes. This point was strongly impressed on my mind by the difficulty of extracting a rubber tube that had slipped off the metal tube and was carried deep into the trachea. After a stormy session in which the patient almost suffocated, the tube was caught by mere groping deep into the trachea with a curved hemostat forceps and extracted from the patient during unconsciousness from asphyxia. In time, all of the laryngectomy cases get along without tubes. As to phonating apparatus, my patients, I believe, have preferred to get along with the simple buccal whisper.

Our last special topic is that of the administration of the anesthetic during the operation in such manner that the operator would

be unhampered in the technic, the anesthetist will have the opportunity of giving an even and safe anesthesia and there is no inhalation of blood.

Anesthesia: In operations on the pharynx and esophagus there is but little trouble. It is in operations on the larynx and trachea that one encounters a real problem.

For a long time I have used a method that has answered every need and has the merit of simplicity. It can also be used for either ether or nitrous oxid. The method is as follows: Rubber tubing having resisting walls to prevent too ready collapse or kinking and of various sizes to fit the trachea are attached to a simple inhalation apparatus if ether is used or if nitrous oxid is used it is attached by a special apparatus to the nitrous oxid inhaler.

SURGERY OF THE LARYNX. TECHNIC.

Anesthetic: In laryngectomy the anesthetic is an important factor and heretofore a great difficulty. The anesthetic difficulties have disappeared by the following plan of operation:

A preliminary tracheotomy is made, and as a result of the local reaction to the tracheotomy the trachea is firmly fixed in its position. At the time of operation the tracheotomy tube is removed and a well-lubricated, snug-fitting rubber tubing, a foot or more long, is slowly and carefully slipped into the trachea. The rubber tubing being slightly larger than the trachea, the latter is dilated and the rubber tube compressed, resulting in a fluid-tight fit. This prevents the entrance of any blood into the respiratory tract. The long piece of rubber tubing thus inserted is then attached to a special apparatus consisting of a funnel, covered with gauze, upon which ether is dropped for anesthesia. By this arrangement the anesthetist is at a distance from the field of operation, thus conferring a double advantage, viz., the anesthetist is unhampered by the operator and the operator is unhampered by the anesthetist, the result being an even anesthesia and best opportunity for a well-controlled operation. Through the tracheal tube nitrous oxid may be given.

Local Anesthesia: As an adjuvant to the inhalation anesthesia and as a protection against the excitation of special reflexes through mechanical stimulation of the trunk or terminals of the superior laryngeal nerves, local infiltration of novocain is used in the manner to be later described.

OPERATIVE TECHNIC FOR TOTAL OR PARTIAL LARYNGECTOMY.—The skin is infiltrated with novocain, along the median line from a point

PRELIMINARY TRACHEOTOMY.

Figure 1. Cocainizing the skin.

Figure 2. Cocainizing the mucous membrane of the trachea.

Figure 3. Iodoform gauze packing of the deep planes of the neck.

above the hyoid bone to the tracheotomy opening. Tissues are divided down to the box of the larynx. Hemostasis throughout the entire operation should be scrupulously attended to. The dissection is now carried down along the lateral aspects of the larynx, —completely freeing the entire lateral aspect from their connections. If at the upper end there is lack of free working-space, a lateral incision parallel with the hyoid is made. The thyro-hyoid muscles above and the sterno-thyroid muscles below are severed. This mobilifies the larynx so far as muscular attachments are concerned. The next move is determined by the precise knowledge the operator has as to the extent of the growth in the larynx. If he knows the lower limits of the growth then he will next divide the trachea, or, perhaps, the cricoid, at a level safe from disease. In making a transverse section of the trachea or the cricoid, especially if the patient is old and the cartilage is ossified, the greatest care must be observed against injuring the esophagus. The transverse incision having been made, the divided end of the larynx is now raised up and the attachment, between the larynx and the esophagus is divided with knife or scissors. In a short, thick neck, the lateral wings of the larynx which extend down laterally so deep as to protect each side of the esophagus, are divided with scissors. In carrying the dissection upward, one reaches the critical point at the upper end of the larynx where the anterior wall of the pharynx and the posterior wall of the larynx become fused. When the upper end of the larynx is finally cut free, severing at the very last the larger arteries, there is left a goodly sized opening—an opening corresponding to the superior opening of the larynx. The hemorrhage being arrested, there now remains the work of re-adjusting the divided tissue.

The reaction from the preliminary tracheotomy has developed the local defenses along the trachea and the bronchial tubes, so as to offer a good protection against infection, and the reaction from the iodoform packing along the lateral, the deep and posterior portion of the neck guarding the mediastinum are now vigorous enough to protect the mediastinum. As to the manner of dealing with the wound, two important questions arise: 1. What shall be done with the end of the trachea? 2. Shall the entire wound of the neck be closed?

As to the trachea, there are two obvious alternatives, viz., the trachea may be sufficiently freed to bring it forward and stitch it to the skin, or it may be left where it lies, excepting at its very upper end, where it may be bent forward and sewed to flaps of skin

LARYNGECTOMY.

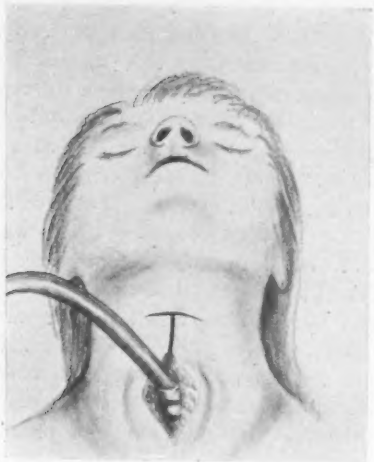

Figure 4. Rubber tubing for anesthesia; preliminary incision extended.

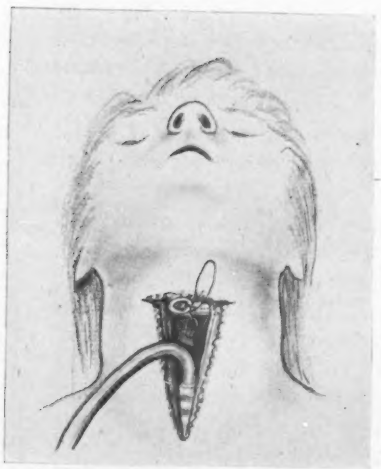

Figure 5. Suturing the opening in the pharynx.

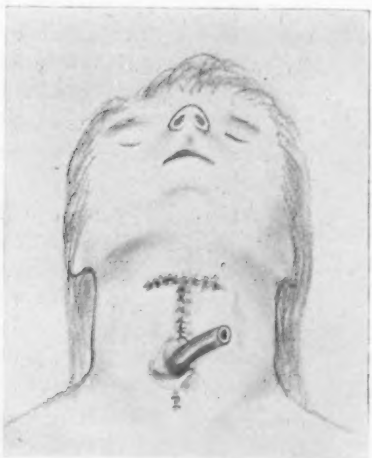

Figure 6. Iodoform gauze packing around the tube.

thrown down from each side. The advantages of bringing the trachea forward and stitching it into the skin is that by this means the trachea is protected against the possibility of the inhalation of wound secretions. Against bringing the trachea forward and fixing it in the skin is the definite chance that the loss of blood-supply of this detachment might result in gangrene of the trachea. This did occur in one of my cases. The one objection to leaving the trachea in its natural bed and transplanting the skin flaps to it is the entrance of wound secretions. This may be prevented by giving the wound adequate care. And this at once brings us to the next point —what shall be done with the remainder of the wound? I believe that it is best to merely suture the opening in the pharynx and, if possible, reinforce this line by drawing other soft parts together below this line of suture. Otherwise leave the entire field open—pack it lightly with iodoform gauze well wrung out. With such a wide-open wound, the secretions may be easily controlled and prevented from entering the trachea. The patient should be sustained by the fullest diet he can take and by the uttermost care in nursing. The sutures in the pharynx may not hold, but this formidable-looking opening will close very readily by granulation and contraction.

There is usually a brisk local reaction following laryngectomy, but with the mediastinum absolutely protected by the previous gauze packing and the broncho-pulmonary tract put on its defensive by a preliminary tracheotomy, the patient is in an excellent position to meet the new condition. Among twenty-eight laryngectomies performed by me, there were two deaths and these two were the most favorable cases of the series. So favorable that I ventured to discard the full preliminary preparations.

In one of these cases I made no preliminary protective operation of any kind and the patient died at the end of five weeks with mediastinal abscess.

In the other I made a preliminary gauze packing in the neck around the trachea but did not make a preliminary tracheotomy. In this case I brought the isolated upper end of the trachea forward to the skin and here anchored it. The entire isolated portion necrosed—and a portion of the trachea even beyond the part isolated also necrosed. This permitted the inhalation of pus into the respiratory tract in the deep region below the level of the sternum.

An autopsy showed no pneumonia, and no mediastinitis, but a septic tracheitis and bronchitis. Death was due to local absorption and to absorption from the trachea and bronchial mucosa. This

case demonstrated in the most conclusive manner the efficiency of the granulation barrier created by the preliminary iodoform packing. In this case, had I made a preliminary tracheotomy, or had I allowed the trachea to remain in its bed, the patient would surely have recovered.

CLINICAL RESULTS: In sixteen of the twenty-four laryngectomies for cancer, the laryngeal box prior to the operation was choked with the growth requiring tracheotomy to prevent suffocation. Most of my patients gave a long history of hoarseness, followed by gradual, though intermittent, obstruction to respiration. In two cases there was associated lues with cancer. One was particularly illustrative of the clinical difficulties of diagnosis. In this case, Dr. Sherman correctly diagnosed the lesion as luetic, and under a course of treatment, the greater part of the laryngeal growth disappeared. Then the residual growth, showing a progressive tendency, was diagnosed by Dr. Sherman as cancer. This patient is now alive and well, more than three years since laryngectomy. Cancer of the larynx, like cancer of the tongue, is, I am sure, not infrequently a sequence to local luetic lesions. Hence the danger of missing the curable stage through hope of luetic cure—especially is this true when luetic diagnosis is firmly established.

I have just operated on a patient referred by Dr. Lenker, for recurrence in the cervical lymphatics. In the primary operation we hoped that a hemi-laryngectomy would be sufficient, but the pathologic examination showed that the growth had crept along the cartilage beyond the line of excision and we therefore excised the remainder of the larynx. It could well have been the opening up of a cancer tissue in the first incomplete operation that forced the cancer cells into the lymphatics. The case now seems to be curable.

In extrinsic cancer, the lymphatics are commonly involved, requiring a much wider dissection. In another case I attempted hemilaryngectomy and cut directly into the cancer. This patient now has a local recurrence. From my personal experience in operating on more than 1,000 cases of cancer in various parts of the body I am absolutely convinced that cutting into the cancer tissue at once alters the prognosis.

I am, therefore, strongly of the opinion that in cancer of the larynx, in view of the good clinical results of total laryngectomy and the hazard of cutting into the growth in partial laryngectomy, together with the uncertainty as to the adequacy of a partial laryngectomy in case of doubt, total laryngectomy should be performed.

In view of results attained in laryngectomy there is no longer any justification for the pessimism which disheartens the cancer victim of to-day and prevents him from utilizing the one chance for his life by stating the surgical status of this subject twenty-five years ago.

Surgical experience has now demonstrated that intrinsic cancer cannot invade hyaline cartilage; that it tardily, if at all, metastasizes; that it frequently follows in the wake of benign tumors and syphilitic ulceration; that every benign tumor and every syphilitic lesion is a possible pre-cancer stage—a potential cancer; that the immediate mortality is now well controlled; that the disability and deformity of the laryngectomized patient is not important enough to have any weight in deciding for or against the operation; that the technic is highly specialized but may be completely mastered; and that if early recognized and completely removed, intrinsic cancer of the larynx is perhaps the most curable cancer of the body.

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Concerning Hyperacusis Willisii. V. URBANTSCHITSCH, *Monatschr. f. Ohrenh. u. Laryngo-Rhinol.*, Bd. 46, Heft 6, 1912, p. 741.

The writer, in a well-known article in Pflueger's *Archiv*, 1883, Band 31, had many years ago demonstrated that the excitability of an affected acoustic nerve may be increased through the influence of sounds. In the present article the writer examined 40 patients showing various aural diseases before and after subjecting them to the influence of tuning-forks and of Bárány's "noise" apparat. In all cases a transient improvement in the perception of the watch and conversation and whisper voice was noticeable. In some cases the improvement lasted for some time. The writer believes that these acoustic irritations in the same way as the mechanical ones (ear massage, riding in trains, etc.) bring about a real increase of the power of hearing. (The writer's method of teaching the deaf by shouting into the ear is well known). GLOGAU.

THE TECHNIC OF INTRA-NASAL OPERATIONS UPON THE LACRIMAL APPARATUS.*

BY SIDNEY YANKAUER, M. D., NEW YORK CITY.

The lacrimal sac, with an opening in the inner canthus of the eye and another within the nose, is principally subject to two diseased conditions, dachryocystitis, both suppurative and non-suppurative, and a stenosed condition of the lacrimal canal, producing excessive tearing, the epiphora. The diagnosis is usually easy enough, for he who runs may read the nature of the disease presenting.

Not more than five per cent of these are of purely ophthalmic origin. The remainder are nasal in origin, as we feel that we can demonstrate. The fact that the lacrimal canal opens into the nose, and that the naso-lacrimal duct is separated from the nose and its accessory cavities by a bony partition which is often quite thin and compressible, and sometimes dehiscent, is the basis of this relationship. The manner in which the diseases of the nose affect the lacrimal apparatus may be summarized in the following way:

1. By continuity along the surface of the mucous membrane, as in acute and chronic rhinitis, chronic suppuration, ozena, etc.

2. By direct extension through the tissues, as in tuberculosis, lues, scleroma, and malignant disease; or by erosion of the intervening bony wall in suppuration of the neighboring sinuses, the maxillary antrum and the anterior ethmoid cells. The latter particularly have been emphasized by some writers as a cause of suppurative dachryocystitis, and authentic cases have been recorded, but although I have opened the ethmoid cells a number of times in these cases, I have thus far not met with a case in which such relationship could be demonstrated. Nor have I met with a case of dachryocystitis in the numerous cases of suppuration of the anterior ethmoid cells which I have seen.

3. Compression of the bony duct from the pressure of a deviated septum or sharp spur, a hypertrophic or cystic middle turbinate bone, nasal polypi, dental cysts, and occluded teeth.

4. Congenital atresia of the naso-lacrimal duct.

5. Injuries from accident, and injuries during operative procedures upon the maxillary antrum, which may occur not only when

*Read at the meeting of the Section on Laryngology and Rhinology of the New York Academy of Medicine, October 23, 1912.

the sinus is curetted from the canine fossa, but also from the intra-nasal operation.

6. Finally, and perhaps the most frequent intra-nasal cause of the conditions under consideration, is hypertrophy of the anterior end of the lower turbinate. This is the form of obstruction of the lacrimal canal which varies so much with the changes of the seasons, with the state of the patient's general health, and as the result of the neuroses which affect the nasal mucous membrane. Obstruction from this cause occurs not only when the swollen mucous membrane occludes the nasal orifice of the canal, but even when the swelling is not so pronounced. For, between the mucous membrane and the bone of the turbinal there is a rich plexus of veins composing the erectile tissue of the turbinal. These veins extend up into the bony lacrimal duct, lying between the periosteum and the membraneous canal. In the so-called hypertrophy of the turbinal, the veins of the turbinal are permanently dilated. In like manner, the veins surrounding the lacrimal canal become dilated, and, as the bony duct is unyielding, pressure is exerted upon the membranous canal. Thickening of the periosteum and the formation of exostoses on the bone are associated with hypertrophy of the turbinal. In like manner, the periosteum of the naso-lacrimal duct becomes thickened, and its lumen is further narrowed by the deposit of new bone upon its walls.

It must be conceded then that dachryocystitis and stricture of the lacrimal duct have their origin within the nose; the obstruction of the lacrimal canal and the inflammation of the lacrimal sac are only secondary to the intra-nasal disease. And here, as elsewhere in the human body, we obtain our best results by removing such causal factors as intra-nasal disease in this instance, curing thereby the existing disease in the lacrimal apparatus.

In order to understand the technic of the various intra-nasal operations which have been performed on the lacrimal apparatus during the past twelve years, and more especially to execute these procedures with such skill as is necessary to ensure success, an exact knowledge of the anatomy of the parts is indispensable. This is especially true as the main difficulties which are met with during the operation are due to the strangeness of the field of operation, to our lack of knowledge of the anatomical relations and variations. Until recently no exact description of the anatomy of this region existed, but in the *Monatsschrift fer Ohrenheilkunde und Laryngo-Rhinologie*, Vol. 46, Heft 4, Onodi has published a detailed de-

scription of his anatomical researches in his characteristic thorough manner.

In order to facilitate the description of the surgical anatomy, I have constructed a model of this region. This model is not an exact reproduction of any particular skull, but was designed to bring out anatomical facts which are of importance from a surgical standpoint.

The outer nasal wall is situated in an oblique direction, from above downwards and outwards; from before backwards it is concave, so that its anterior part, in which the field of operation lies, runs obliquely outwards and backwards. The naso-lacrimal duct, lying within this wall, must therefore run in a correspondingly oblique direction. It is generally described as a slightly curved passage, ending at its nasal orifice on the under surface of the lower turbinate bone. This description is not, however, exactly in accord with the facts. The posterior wall of the duct does not end abruptly under the turbinate, but it curves gradually backwards, becoming continuous with the grooved under-surface of the lower turbinate; in fact, the lacrimal process of the lower turbinate bone forms the lower third of the posterior wall of the duct. The anterior wall, also, is continued below the turbinate, along the outer nasal wall, in the form of a more or less sharp ridge running downwards and backwards, and disappearing near the floor of the nose. This ridge has not been previously described, but its presence constitutes a useful surgical landmark. The lacrimal duct is, therefore, continued under the lower turbinate as an open groove, so that the lacrimal groove, the naso-lacrimal duct, and the hollow under-surface of the lower turbinated bone, form one continuous curved passage, whose upper and posterior wall is formed by a transversely grooved, composite plate of bone. Those who remember Zuckerkandl's description of the ethmoid cells will recall that this region is described as composed of several basic, transverse lamellae of bone. The lowermost of these is the lamella of the uncinate process, the next, the lamella of the middle turbinate. These lamellae run in a curved direction upward and forwards. Now, the plate of bone which forms the upper and posterior wall of the lacrimal passage runs in a corresponding direction, exactly parallel to the lamellae of the ethmoid, and it might be called the lamella of the lower turbinate. And just as beneath the lamella of the middle turbinate we find a long narrow passage, the infundibulum, opening above into a large cavity, the frontal sinus, so under the lamella of the lower turbinate we find a long narrow passage the lacrimal canal,

opening above into a cavity, the lacrimal sac. Hence it is not only from a clinical standpoint, but from an anatomical standpoint as well that we are justified in regarding the lacrimal sac as one of the accessory cavities of the nose. This description simplifies the relation of the ethmoid cells to the duct, for all ethmoid cells lie between the basic lamellae of which the region is composed. They therefore lie posterior to the duct, throughout most of its length. Above the middle of the lacrimal groove, as seen from the orbit, the lacrimal sac comes into relation posteriorly with the infundibular cell. The middle of the lacrimal groove corresponds, on the nasal side, with the line of attachment of the middle turbinate bone. This cell therefore lies above the attachment of the middle turbinate, and is the cell which Mosher has recently described as the portal of entry in his operations upon the ethmoid. This cell encroaches slightly upon the inner wall of the lacrimal groove, and is the cell which is apt to be injured in Toti's operation. Below the attachment of the middle turbinate, the duct lies in relation to the uncinate process. When this process contains cells, as it sometimes does, these cells lie immediately behind the middle part of the duct. When they are absent, the posterior wall of the duct lies in relation to the middle meatus on its inner half, and to the maxillary antrum on its outer half.

The entire lacrimal duct, lying as it does between the nose and the antrum, leaves its imprint upon the inner or nasal wall of the antrum. When viewed from the antral side, it is seen as a rounded ridge extending in a curved manner from the anterior superior angle of the antrum downwards and backwards. The upper half of this ridge corresponds to the naso-lacrimal duct; its lower half to the hollow space under the lower turbinal. The attachment of the lower turbinal corresponds to the upper border of the ridge. This ridge is not pronounced in more than one half of the cases, according to Onodi. When the ridge is very pronounced, there is found, between it and the anterior or facial wall of the antrum, a more or less deep groove, a part of the infra-orbital recess of the antrum. The presence of a deep groove in this region is important from a surgical standpoint; for in such cases it is possible to injure the lacrimal duct in operating upon the antrum, and also to injure the antrum in operating upon the lacrimal duct by the intra-nasal route.

The danger of opening the antrum has been mentioned in the literature, and in some of the published illustrations of horizontal sections of this region a formation is shown in which the infra-

orbital recess approaches close to the nasal surface of the bone, in front of the duct, so that the latter is nearly surrounded by antrum. In none of the anatomical material at my disposal have I found such a formation, and in none of my operations has the antrum been injured. I believe, therefore, that this danger has been exaggerated.

The inner or nasal wall of the duct is thin, and easily cut through with punch forceps, except at its lowest part, along the attachment of the lower turbinal. The outer and posterior walls are also thin, and penetration of these walls means injury to the antrum or ethmoid cells. The anterior wall is formed by the thick, grooved, posterior surface of the nasal process of the superior maxillary bone. At its lower part, along the attachment of the lower turbinate bone, where the bone fibers run in all directions, it is very dense and tough, but higher up, where the bone fibers all run vertically it yields more easily to the chisel.

The lumen of the bony duct is normally about one-quarter of an inch in diameter, but in pathological cases it may be so constricted that the introduction of any but the smallest of instruments becomes difficult. Bony strictures occur either at the orbital orifice or at the nasal opening of the duct.

The periosteum of the duct is easily separated from the bone except in the neighborhood of bony strictures. The periosteum of the duct as well as that of the orbital part of the lacrimal groove presents the usual white, glistening appearance, and is easily recognized. Between the periosteum and the mucous membrane of the canal, a plexus of large veins is found, which is continuous with the venous channels of the lower turbinal. The lumen of the lacrimal canal is normally narrowest at its upped end, i. e. at the neck of the sac, but in disease conditions strictures may occur in any part of its course. These strictures vary in degree, but complete occlusion of the canal from inflammatory adhesions was found in some part of the passage in all the cases of chronic suppuration of the sac which I have operated upon. Under these circumstances it is impossible to render the canal anesthetic or ischemic by injecting solutions from above.

The lower opening of the canal varies considerably. It is sometimes a round opening, communicating freely with the nose. Along the edge of the ridge of bone which as above described runs downwards and backwards from the anterior margin of the opening, the mucous membrane is reduplicated, forming a fold which has been

described as the valve of Hasner. When the upper part of this fold extends far backwards, the opening of the canal appears to be situated in the outer nasal wall, below the attachment of the turbinal. At times, the canal may extend downward in the mucous membrane of the nasal wall, below the site of the opening, so as to form a pocket in the mucous membrane. These variations of the nasal opening make it difficult to insert a probe or a cannula into the canal from below for the purpose of anesthetizing it. In about one-half of the cases it is possible to determine the character of the opening before operation. If the lower turbinal is thoroughly cocainized and adrenalinized, the nasal orifice of the canal may be seen by inserting a Holmes' naso-pharyngoscope under the turbinate. It appears much magnified, because of its proximity to the lens, but its character and location can be determined.

In planning an operative procedure on this region, a consideration of the mechanism by which the tears are drained into the nose is of the first importance. It was formerly supposed that Horner's muscle and the orbicularis palpebrarum exerted a contracting and dilating action upon the sac; but the parts are not favorably arranged for such a mode of action. On the other hand, the similarity of the lacrimal apparatus to the accessory sinuses of the nose suggests a similar drainage mechanism. As was pointed out by the writer in an article before this section a few years ago, the drainage of the nasal accessory sinuses is accomplished by the activity of the cilia, and by capillary action and syphonage. Like the other nasal accessory cavities, the lacrimal passages are lined with ciliated epithelium, whose activity is directed toward the nose. The shape and dimensions of these passages are especially favorable for capillary syphonage. The two canaliculi together form the short arm of the syphon, the lacrimal canal the long arm. The lacrimal sac is the bend of the syphon. Now, the power of a syphon depends largely upon the difference in length between the short and the long arms. As has been pointed out above in the description of the anatomy, the nasal duct does not end abruptly at its nasal orifice, but continues in a gradual curved manner into the groove below the lower turbinate. The lacrimal canal in like manner is continued into the mucous membrane of the under surface of the turbinate, so that the long arm of the syphon must be considered as extending as far back as the posterior end of the lower turbinate. Although the amount of fluid which must be carried off at any one time by this syphon is small, the process must be a continuous one. For the lacrimal fluid as it escapes from the glands contains over one

per cent of sodium chlorid. A considerable part of this fluid disappears by evaporation. If some of the fluid were not continually removed by the lacrimal apparatus, the eye would soon become filled with a concentrated solution of salt. In order to maintain a constant chemical composition within the conjunctival sac, a continuous secretion and drainage of tears is absolutely necessary.

During the past twelve years, numerous attempts had been made, chiefly by rhinologists, to perfect an intra-nasal operation upon the lacrimal apparatus. The technic employed, especially by the early operators, varied in their different cases. A description of their technic can be found in the articles by Onodi above quoted, and in an article by Polyak in Semon's *Internationales Centralblatt fuer Laryngologie*, September, 1912.

There are two procedures employed in these operations which I wish to discuss. The first of these is the complete obliteration of the lacrimal canal. This has been accomplished intra-nasally, after the removal of the anterior third of the lower turbinate bone, by opening the nasal duct with a chisel, and curetting out its lining mucous membrane. By extending the opening in the bone as high up as the anterior end of the middle turbinate, it is possible to reach the lacrimal sac with the curette, and to remove a considerable part of its mucous membrane, although this can never be done as thoroughly by the intra-nasal route as by an external operation. In whatever way the lacrimal passage is obliterated, its function is completely destroyed. Such procedures should be the first to be abandoned as soon as other means are found to cure the disease. It is true that patients who have a suppurating lacrimal sac suffer many inconveniences, not the least of which is the excessive epiphora, and that when the diseased sac is removed whether by intra-nasal or external operation their sufferings are greatly lessened. But the epiphora remains. According to Fuchs, in the latest edition of his book, it persists to some degree in all of the cases. This statement is substantiated by the fact that opthalmologists have found it necessary to invent the operation for the removal of the lacrimal gland, in the hope that thereby the secretion of tears will be diminished, a hope which is by no means realized in all the cases. The removal of the mucous membrane from the lacrimal sac and canal is no more justified than is the removal of the mucous membrane from the antrum of Highmore, a procedure which has for some years been abandoned by rhinologists; or the removal of the mucous membrane from the ethmoid cells and frontal sinus, procedures

which are still practiced by rhinologists, but which the writer believes they will eventually learn to discontinue.

The second plan of procedure, which is the one followed by most of the intra-nasal operators, is the establishment of a direct fistulous communication between the lacrimal sac or canal, and the nasal chamber. After the removal of the anterior end of the lower turbinate, the mucous membrane and bone over the nasal duct and the lower part of the lacrimal groove are removed with punch-forceps or chisel. The membranous canal is then slit open and the parts allowed to heal. The result is that the lacrimal canal is converted into an open groove, which, in order to include the lacrimal sac, must extend as far up as the anterior end of the middle turbinate bone. The most recent of these operations is that of J. M. West, which he calls "window resection of the lacrimal canal." West does not remove the lower turbinate, but enters the nasal duct in the middle meatus, making an opening about one centimeter long, the upper end of which lies somewhat above the attachment of the middle turbinate. In this class of operations may be included the method of Toti, even though it is performed by the external route. His method consists of an incision on the side of the nose, internal to the attachment of the orbital ligaments and muscles, through which the lacrimal sac is separated from the bone. The anterior edge of the lacrimal groove and an adjacent part of the lower orbital margin are then removed with the chisel, an opening of considerable size being made through the bone, down to the muco-periosteum of sac is excised and then an opening is made in the nasal mucous the outer nasal wall. The internal or periosteal wall of the lacrimal membrane corresponding in size, shape, and location to the remaining part of the sac. The outer wall of the sac is then sutured to the nasal mucous membrane. The end-result of this operation is that the outer wall of the sac is displaced inwards until it comes to lie flush with the outer wall of the nasal chamber, of which it now forms a part. The canaliculi open directly into the middle meatus.

These operations, as well as some modifications which have been proposed by other rhinologists, agree in establishing a free and direct communication between the sac and the nasal chamber, so that the tears pass directly from the canaliculi into the nose. The lacrimal canal, which is the long arm of the lacrimal syphon, is entirely eliminated as a factor in the drainage. By making an opening in the bend of the syphon, its efficiency is entirely destroyed.

That chronic suppuration of the sac can be cured by the excellent vent which is established for the escape of the pus by these opera-

tions can not be doubted. West has reported a case of epiphora cured by his operation, but the details are not accessible to me at the present time. Toti, in his latest report, states that all of the last forty-one cases were completely cured, and that epiphora continued after the operation in only one of these cases. It must be remembered, however, that Toti operates in sunny Italy, where the climate is milder and less likely to provoke the secretion of tears than the more severe climate of our city, and that therefore the efficiency of the drainage mechanism is not subjected to so severe a test.

The fact that drainage of tears takes place at all after the Toti operation proves that muscular activity plays a very small and negligible part in the mechanism of drainage, while on the other hand, the importance of capillary activity receives further corroboration by the statement of Toti that the best results are obtained in cases in which the canaliculi have not been slit open. Toti reports one case in which the previously opened canaliculi have become closed and the puncta restored after the operation; the writer has noticed a similar occurrence after operation by his own method.

The opening in the middle meatus has a marked tendency to contract, as has been noted by several operators. In the writer's cases, it always closed.

The establishment of a fistula between the lacrimal sac and the nose not only creates a free passage from the conjunctiva into the nose, but it also creates an easy communication from the nose to the conjunctiva, so that when the patient blows his nose, air and nasal mucus are blown from the nose into the conjunctival sac. This disadvantage has been noted by Halle, Ritter, and Polyak. I have observed in my own cases that this occurs even when the canaliculi have not been slit open; it occurs not only when the fistulous communication is large, but continues when it has contracted down to a pin-point opening. To subject the patient, for the remainder of his life to the possibility of blowing his nose into his eyes is not only an extremely disagreeable substitute for his previous epiphora, but is dangerous to the conjunctiva, and in the opinion of the writer constitutes one of the most serious drawbacks to this method of operating.

The operation which the writer has perfected after some experimenting along the same lines as those above described is more radical than many of them inasmuch as it removes all the organic effects of the disease process, but yet is more conservative than any, because it preserves intact the anatomical relations of the parts,

permitting thereby a complete restoration of the function of the lacrimal passages. Briefly stated, it consists of the following steps: Temporary elevation of the mucous membrane of the outer nasal wall; resection of the bony wall of the duct; slitting open the entire membranous canal from below its nasal orifice up to and including the sac, thereby dividing all strictures, destroying the venous plexus surrounding the canal and evacuating pus; and finally, replacing the mucous membrane of the outer nasal wall. The end-result of the operation is the enlargement of the bony and membranous passages, and the re-establishment of drainage in the manner originally designed by nature.

The details of the technic are as follows: Previous to the operation the patient receives an injection of morphin or morphin-skopolamin. The patient is placed in the semi-recumbent position on an operating table, the operator standing by his side. This position is desirable because the field of operation is located so far anteriorly in the upper part of the nose that the operator's eye must at times be on a level with the patient's chin.

The interior of the nose is anesthetized with a solution of 10 per cent cocain and 1 to 2000 adrenalin, by spray or application in the usual manner, special attention being given to the under-surface of the lower turbinal. If the lacrimal canal is pervious, a weak solution of cocain-adrenalin may be injected into the canal through the lower punctum. If it is not pervious, an attempt may be made to inject the canal from below, after locating its nasal orifice with the Holmes naso-pharyngoscope. These measures usually render the field of operation insensative and ischemic, but if necessary they may be supplanted by subperiosteal injections of weaker solutions along the line of incision in the nose, and upon the outside of the nose below the inner canthus.

A self-retaining speculum adds to the convenience of the operator. As the outer nasal wall is directed obliquely backward and outward from the nostril, a better exposure is obtained if the septum is retracted toward the opposite side. For this reason, a speculum which opens the nostril from side to side, like Myles' speculum, is preferable, even though it must be held in place by an assistant. Freer's retracters can also be used.

The incision is begun at the anterior end of the attachment of the middle turbinate bone with an angular knife. It extends horizontally forward for a distance of 0.5 cm. From this point it is continued downwards with an ordinary scalpel to the anterior end of

the attachment of the lower turbinal, and then backward along the extreme edge of the lower turbinal for a distance of about 2 cm. (Figure 1, A B C D). The incision is made down to the bone, and the irregular muco-periosteal flap thus outlined is elevated. The lower half of the lower turbinate bone is very rough, and the separation of the muco-periosteum requires a sharp elevator. Occasionally it is necessary to facilitate matters by cutting with the scissors the prolongations of periosteum which extend into the deep pits on the surface of the bone. The flap is turned backwards, its upper part being tucked under the middle turbinate, where it is held out of the way during the entire operation.

The muco-periosteum is then separated from the outer surface of the turbinal in order to remove the anterior third of the bone.

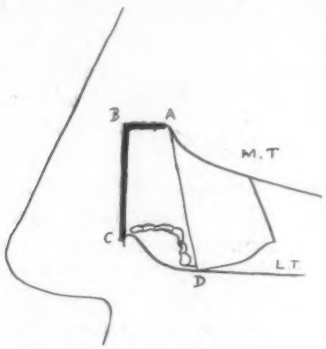

Figure 1 shows incision ABCD, the flap retracted and the anterior third of the lower turbinate bone removed.

As the outer surface of the bone is just as rough as the inner surface, the muco-periosteum is elevated for a short distance at a time, and the bone punched away in small pieces. (Figure 1). The preservation of the mucous membrane of the outer surface of the lower turbinal is necessary to prevent contraction of the nasal orifice of the canal after the operation. When the anterior end of the turbinal is much hypertrophied, its lowed edge may be removed *in toto* with the punch-forceps.

The line of attachment of the turbinate bone to the outer nasal wall curves upwards from its anterior end, and the bone must be removed close up to its attachment and as far back as the posterior margin of the nasal orifice of the duct.

When the lacrimal canal has not been cocainized and adrenalinized, owing to the obstruction at the neck of the sac there is apt to be

some pain and considerable bleeding from the veins surrounding the membranous canal, at this stage of the operation. In order to inject the power part of the canal from below, it is necessary to locate its nasal orifice. This is done by raising up the outer turbinal mucous membrane with an elevator and inserting a probe, the end of which is bent upwards for about 4mm. If the probe is inserted anteriorly and moved backwards, it will glide over the valve or fold of Hasner, and will not enter the canal. It is preferable to insert the probe some distance back and to move it forward, so that its end will pass under the fold of Hasner and enter the canal. When the nasal orifice of the membranous canal can not be found, the canal may be injected by plunging a hypodermic needle, bent at right angles through its wall at the nasal orifice of the bony duct.

The precise localization of the nasal orifice of the bony duct is an important step in the operation, as the removal of the inner wall of the duct is begun at this point. When the orifice is normal in size its localization is not difficult; but when it has become stenosed as a result of the disease it is not always easy to locate it with certainty.

After the removal of the anterior third of the lower turbinate bone, a stump is left which forms an elevation on the outer nasal wall. Below this line of attachment, the mucous membrane of the outer turbinal surface is reflected upon the outer nasal wall. The nasolacrimal duct, as above described, is continued below the lower turbinal in the form of a groove, whose anterior edge forms a distinct ridge on the outer nasal wall in front of the orifice of the duct. If, now, the right angled probe is placed on the outer nasal wall just below the stump of the turbinate, above the reflection of the mucous membrane, in front of the orifice of the duct, with its point directed outwards, and then moved backwards, the point will glide over the ridge, and will suddenly disappear in a lateral direction in the hollow of the nasal duct. The point of the probe can be turned upwards, and by moving it back and forth and from side to side, definite information as to the size, shape, and location of the orifice is obtained.

The next step is the removal of the inner edge of the nasal orifice of the duct. This is a thick, hard piece of bone. The use of a chisel for this purpose would endanger the antrum. A suitable forceps could not be found, so that it was necessary to design a special forceps for the purpose. This forceps has a small but stout jaw, turned upwards nearly at right angles to the shank. After

separating the membranous canal from the duct by means of the right-angled probe or the hook-shaped elevator, the male blade of the forceps is introduced into the duct and the bone cut through.

The anterior edge of the nasal orifice is now removed. This must be done with the chisel, the most suitable being a gouge, bevelled from the inside. As the chisel-cut ends in the incision previously made by the forceps, the antrum behind the orifice can not be injured. To avoid injury to the antrum in front of the duct, which may occur when a deep infra-orbital recess lies close to the surface of the nasal wall, the bone is removed gradually, in thin shavings, the probe being used after each cut. The cut in the bone is deepened until the entire width of the membranous canal is clearly visible. Injury to the membranous canal can and should be carefully avoided.

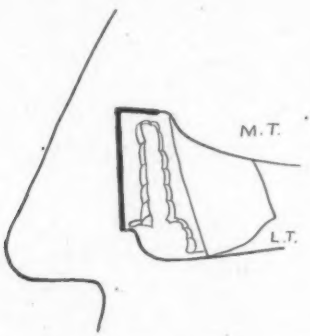

Figure 2 shows the inner wall of the bony naso-lacrimal duct removed.

The management of the nasal orifice, especially when it is small, is one of the chief difficulties that is met, but when once the membranous canal has been brought clearly into view, the operation proceeds with greater celerity.

Above the nasal orifice the inner wall of the duct is thin, the anterior wall thick and dense. The inner wall is removed with the forceps, and, to avoid injury to the ethmoid cells which lie behind the duct in the middle part of its course, this is done first, before the corresponding part of the anterior wall is attacked with the chisel. As the upper parts are reached, an ordinary straight nasal punch is more easily adapted to the parts than the special forceps.

When the neighborhood of the orbital orifice is reached, the gouge can not be applied to advantage. For the enlargement of this orifice the guarded chisel which the writer devised some years ago for the

enlargement of the fronto-nasal duct is the most efficient. When the foot of this instrument is passed through the orbital orifice, it can be seen and felt through the skin below the inner canthus of the eye. The upper limit of the cut in the bone is reached at the level of the attachment of the middle turbinate bone. When sufficient bone has been removed the entire lacrimal passage is clearly visible, from the middle of the lacrimal sac down to the nasal orifice, (Figure 2).

The next step in the operation is to slit open the entire membranous passage. As the inner wall of the canal is continuous with the muco-periosteum of the outer turbinal surface, the incision is begun at the lower edge of this muco-periosteum, with a curved nasal scissors. The nasal orifice of the canal is sometimes obscured

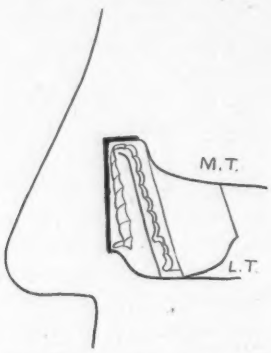

Figure 3 shows the mucous membrane of the outer turbinal surface and the inner wall of the membranous lacrimal canal slit open.

by the presence of a well-marked fold of Hasner. This is cut through with the scissors. When there is no stenosis at the neck of the sac, the incision is extended up to the middle of the sac with the scissors. When the sac is filled with pus or mucus, its lumen is separated from the lumen of the canal by a complete stenosis near the neck of the sac, caused by inflammatory adhesion of its walls. As long as the fluid remains in the sac these adhesions can not be separated. The sac is therefore opened by inserting a hook-shaped knife into it as high up as possible, and cutting downward to the neck. After the contents have been removed, (by irrigation if they are purulent) the right-angled probe is inserted into the sac with its point downwards, and as the adhesions are separated, the neck of the sac is opened with the scissors, or by cutting down on the probe with a small knife, (Figure 3). The incision in the mem-

branous canal is made as far back on its inner wall as possible. The part of the canal wall in front of the incision is brought forward, and laid against the bone.

The mucous membrane of the outer nasal wall, which during the entire operation has been tucked away under the middle turbinal, is now brought forward and returned to its original position. It may be held in place by a single suture at its anterior inferior border.

When there is pus in the lacrimal sac, a piece of the flap about 4 mm. in diameter is removed from its upper corner in a position corresponding to the incision in the sac to provide direct drainage into the middle meatus of the nose.

After the operation the nostril is packed with gauze to prevent hemorrhage and to insure perfect co-aptation of the entire flap. The packing is removed after twenty-four hours and the lacrimal passage irrigated with normal saline solution. When there is pus in the sac, the opening in the middle meatus remains patent. In such cases the sac is irrigated daily with the salt solution.

During this time there is some epiphora, and when the patient blows his nose air is driven through the fistula into the eye. When the suppurative inflammation has subsided and drainage has become re-established through the natural passages, the opening in the middle meatus closes. To determine when this opening has completely closed I have employed the following test: A pledget of dry absorbent cotton is inserted into the middle meatus, and a second one in the lower meatus, below the lower turbinal and at about its middle. A thin watery solution of starch is then injected into the sac through the lower punctum. After a few minutes the cotton pledgets are removed and tested for starch by means of a solution of iodin. When the pledgets from the middle meatus remains unaltered by the iodin, while that from the lower meatus turns blue, we know that none of the starch solution escaped into the middle meatus, and that the lacrimal passage has resumed its normal function.

The writer has operated upon 9 cases during the past three years according to the technics here described. The number would have been greater were it not for the fact that these patients consult the ophthalmologists, and not the rhinologists.

Of the nine cases, two were cases of mucocole of the sac, the other seven were suppurative. Of the latter, three had intermittent attacks of suppuration only, and were operated during the intervals. The other four had pus in the sac at the time of operation.

The cases were all of long standing, from one to three years. The first case was operated in 1909, the last case six months ago.

The suppuration ceased in all the cases after the operation, and has not recurred in any of them. The epiphora was completely relieved in all but one of the cases. This was a case of suppuration in both sacs, operated two years ago. In one eye there is still a slight degree of epiphora, which is noticeable only when the patient has a cold in the head.

In one case, a patient with pus in the sac for over a year, I first opened the lacrimal canal in the middle meatus in a manner similar to the operation of West. The suppuration ceased after the operation, but the artificial opening gradually contracted and the sac filled up with mucus. I thereupon completed the operation by a submucous resection of the anterior third of the lower turbinal, and enlarged the nasal orifice of the bony duct, which was stenosed, and only about 2 mm. in diameter. The improved drainage established by the second operation stopped the accumulation of mucus in the sac. The opening in the middle meatus also closed. The epiphora has been completely relieved, and the patient has remained well for two years, to date.

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The Pathology and Treatment of Diseases of the Larynx. O. FRESE, *Mediz. Klinik,* Jan. 28, 1912.

In the form of an academic lecture the writer deals exhaustively with the pathology and therapy of the various laryngeal affections. After mentioning the methods of examination in vogue, the writer describes the pathology and treatment of laryngeal tuberculosis. In advanced pulmonary tuberculosis, continuous fever, night sweats and marked emaciation, endo-laryngeal operation should never be undertaken. In endo-laryngeal operative interference, the writer prefers galvano-cautery to any other procedure. To benign and malignant new formations of the larynx special attention is called. The nerve-affections of the larynx are thoroughly analyzed and their anatomical changes and clinical symptoms are fully described.

GLOGAU.

TRANSPLANTATION OF A PIECE OF CARTILAGE INTO THE SEPTUM TO PREVENT PERFORATION AFTER SUBMUCOUS RESECTION.*

BY RICHARD H. BROWN, M. D., CHICAGO.

It is a very frequent occurrence in operating on a deflected septum, by the submucous method, to find that the flap over the convexity has been already divided by pressure necrosis over the sharp ridge of the spur, or so thinned that it is a practical impossibility to raise it intact.

It is also unfortunately true that in just such cases of sharp bony ridges the membrane of the concavity oftenest dips down into a sharp furrow where it is easily injured.

We have then a larger or smaller hole through the membrane of the hollow side directly opposite a slit between the upper and lower flaps of the convexity. While there is plenty of membrane, quite redundant in fact in the experience of the essayist, it has not been satisfactory to fold the upper over the lower flap. Either infection works in between them or, more often, the membranes retract in healing and leave a perforation. Stitches seem to cut through, to say nothing of the difficulty of inserting them.

In October, 1909, in such a case as described, where a perforation seemed inevitable, it occurred to me that if I took some substance which would not irritate, to place between the two membranes, either to grow in or be slowly absorbed, it might prevent the accident. The most convenient thing at hand was the piece of the cartilage removed from the front of the septum. This I took, split into a thin splint, shaped to suit and inserted between the two sides, making a wall to take the place of the original bone between the membranes. The flaps were packed together between gutta percha splints as usual, and much to my gratification there was an uneventful healing without any trace of perforation. The patient, a clinic case, disappeared from observation in a couple of weeks and I never knew whether the cartilaginous graft grew in or was absorbed.

Twice within a few months after this, the same method was employed on clinic patients with the same results. There was smooth healing within a couple of weeks, but the after-history is unknown.

*Read at the meeting of the Chicago Laryngological Society, May 21, 1912.

Case 1. The first case of which I have detailed notes occurred in January, 1911. C. S., a medical student, had a sharp anterior deflection to the right, running along the front line of the vomer into a sharp spur adherent for two-thirds of an inch to the inferior turbinate. In the dissection the membrane came loose in an upper and lower flap, in spite of the utmost care in taking away some tissue from the turbinate in freeing the adhesion.

The membrane of the concavity was extremely adherent and became torn seriously at the very center of the groove. A large piece of the quadrangular cartilage was shaped from the part removed, washed in a normal salt solution and inserted as described before. Healing was a little protracted on account of the loss of tissue of the turbinate, but the result was a smooth, whole septum. I have followed the case since, and as near as I can tell, the thin cartilage was gradually absorbed, but it has left the septum free from the slightest perforation.

Case 2. W. S., a medical student. May, 1911. The deformity of the septum was nearly identical with the last, and the same accident occurred, and like treatment was employed. In this case there was a sharp fever attack, probably of pneumococcus origin, with a temperature of from 104° to 105° for thirty-six hours, but without apparently affecting the nose, which healed very nicely. The transplanted piece of cartilage in some way became slightly tilted up so that the lower edge projected over the lower flap of the membrane in the concavity. It could not be replaced when discovered and I feared failure. It healed in, however, leaving a slight cartilaginous spur in its place. This was gradually absorbed in the course of two and a half months, leaving a smooth, unbroken septum when I examined it late last summer.

Case 3. H. J., teacher. Case almost identical with the last two, excepting that I had removed very little cartilage and the bone was too crooked to use for purposes of transplantation. I inserted the largest piece of cartilage available, which I split and opened up to make longer. Healing at first was uneventful, with the exception of adherent crusts over both sides at place of tear. These disappeared at the end of three weeks, leaving a very frail membrane. Two months later I saw him again, and found these crusts connected through a small perforation the size of one-half of the split cartilage. This was my first partial failure after using this method, and I feel sure would not have occurred had I been able to employ a large, unbroken piece of tissue to transplant.

Case 4. W. C., medical student. This was a case of extremely irregular septum caused by traumatism. The nose had been broken three times in foot-ball accidents and three good men had preferred to "side-step" the operation. There was a fair-sized tear on the left side during the dissection, with a slight puncture directly opposite, so that I could see through after replacing the flaps. There was not even a small piece of straight cartilage to be found, so I was compelled to take the least curved piece, thinning it markedly at the convexity and inserting it curved in the opposite way to the original septal wall. The result was perfect so far as preventing perforation was concerned, but the splint caused some annoyance by pushing the edge of the incision away from the middle line. This, however, lasted only a couple of weeks and the final result was a perfect septum, straight and with no perforation.

The technic of this little plan presents no difficulty, simply inserting a piece of thin cartilage of size sufficient to protect the opening of the membrane and holding it in position until the rent is healed. As near as I can observe, the transplanted piece has been completely absorbed. This, in fact, we should expect, but it answers its purpose nicely in acting as a temporary plug for the healing down of the torn membrane.

In a careful search of the literature of the last six years, I find that Dr. Isabelle D. Kerr, of Boston,[1] reports a similar case. She hit upon the same plan and reports exactly the same favorable result. This is the only case of the kind that I have been able to find in my reading.

Dr. D. C. Greene[2] reports twice transplanting cartilaginous splints from other septa to fill up the depression caused by destruction of the quadrangular cartilage by septal abscess, a much more delicate procedure than what I report and perfectly successful. Goodale[3] has reported over ten years ago pushing up the cartilage to raise depressions after injury. Franzenheim[4] and Wm. W. Custer[5] and many others have transplanted bone from the forehead or a piece of rib, etc., under the skin to raise depressions.

Dr. J. C. Beck[6] tells me, in conversation, that he has transplanted cartilage between the flaps after submucous operation to see whether it would grow. He finds it gradually becomes absorbed. He also quotes Halle as reporting the same results.

I do not claim any priority in reporting this method. I have employed it when required during the last two years and have taught it in my college work. It is entirely possible that a number

of others may have used this plan. If so, I should be glad to hear their experiences. To those who have not tried it, I would recommend it as a very easy way of preventing the bad result from an accident that I believe is by no means infrequent.

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7 West Madison Street.

Suturing as a Substitute for Splints After the Submucous Resection of the Nasal Septum. O. A. LOTHROP, *Boston Med. and Surg. Jour., March* 28, 1912, p. 483.

The writer suggests an ingenious method for keeping the two flaps of mucous membrane together by means of sutures passed through from one naris to the other and then the ends brought out through each nostril to be tied across in front of the columella. The sutures are passed by a needle of the author's design, and several are used, insuring approximation of the flaps at each point of passage. The result is a fan-shaped series of sutures with the radiating spokes running opposite each other on each side of the septum to a handle at the columella. These radiating sutures perform satisfactorily the function of preventing a hemorrhage between the flaps, and do away with the many disadvantages experienced by the different forms of packing. To the criticism that each suture is passed through and through and would be likely to be a focus for a subsequent perforation, the reply is made that: "As the needle-holes are so small and most of the sutures are placed from one to two inches back, the danger of a permanent perforation which would be visible would seem very remote." Cuts showing the instruments and explaining the method accompany the article. BERRY (MOSHER.)

SOME CONSIDERATIONS IN REFERENCE TO THE NASAL SEPTUM.*

BY WILLIAM R. BUTT, M. D., PHILADELPHIA.

The purpose of this paper is to set down some of the points which have come to my attention in an effort to get a better understanding of the practical anatomy of the nasal septum.

Though the child is nearly always born with a straight septum yet the character of the deflections of later life are influenced by the septum's embryological formation. An exhaustive and authoritative account of the development of the nose is contained in Bardeleben's "Handbuch der Anatomie des Menschen" in the volume on the nose, written by Kallius, while the most recent book is that of Keibel and Mall, also in German, though shortly to be published in English. The following account is taken mostly from English text-books.

It should be remembered that all the structures develop in pairs or from like contributions from each side of the embryo. The nasal organs first appear as little pits above the primitive mouth on each side of the middle line. On the surface these olfactory pits are continuous with the primitive mouth-cavity as little bays; but as they deepen they grow upward and backward as blind pouches, leaving a layer of tissue between themselves and the mouth. Looking at the orifices of the olfactory pouches from the front, we see between them the mesial nasal process growing downward into the primitive mouth. External to the nasal pouches are the lateral nasal processes, and from the external inferior angle of the primitive mouth, the maxillary processes of the first visceral arch grow up toward the nasal pouches. Looked at from within the primitive mouth, we see that these processes, visible externally, are continued in the mouth as ridges. It is interesting to see what parts these processes and ridges form in the adult:

From the mesial nasal processes are formed later the dorsum and tip of the nose, the anterior soft part of the septum, the middle of the upper lip and a small wedge-shaped part of the upper jaw which is particularly of importance in early childhood—i. e., the pre-maxillary portion of the upper jaw."

From the lateral nasal processes are formed the alae of the nose, and by the fusion of the lateral nasal processes with the

*Read at the meeting of the Philadelphia College of Physicians, Section on Otology, Rhinology and Laryngology, February 21, 1912.

maxillary processes, the greater part of the face and hard palate are formed.

These sets of processes, just mentioned, close in around the front part of the nasal pouches forming the external nose—the closure for a while not being completed below, leaving the nasal cavity in communication with the mouth anteriorly—as is seen in children with cleft-palate and hare-lip. The olfactory pouches grow backward until they rupture posterially into the back portion of the primitive mouth-cavity forming the posterior choanae. They also enlarge upward toward the fore-brain and by the fifth week of the embryo, they are connected with it by nerve fibres.

The permanent hard palate is formed at a slightly lower level than the primitive membranous palate, by shelf-like outgrowths from the sides of the primitive mouth-cavity. These palatal processes grow toward the mesial line, fusing with each other posterially, while in front the wedge-shaped pre-maxillae are interposed between them.

The thick mass of tissue which lay between the two olfactory pits in their backward growth, constitutes the frame-work in which the nasal septum is laid down. The primitive septal cartilage grows forward from its attachment to the sphenoid. (Kallius). For a time after the formation of the permanent hard palate, the septum does not descend to join the palatal processes at their median suture; so that the two nasal cavities communicate together along the floor for a time. By further downward growth of the septum to the permanent hard palate this communication is closed off.

Jacobson's organs, embedded as blind pouches on each side of the septum behind the nasal spine of the superior maxillae, grow actively during fetal life, and are the representatives of part of the olfactory apparatus in lower animals. In the human embryo they are lined with epithelium, resembling that of the adult olfactory area and (according to Kallius) receive twigs of the olfactory nerve. They begin to atrophy before birth and in the adult are represented only by minute blind pouches; though the scrolls of cartilage which underlie the organ remain in the adult septum as the Vomerine cartilages.

A consideration of the child's septum and its surroundings during the first year, give some ideas of its lines of development. At birth, the whole septum is cartilaginous with the exception of the vomer. The pre-maxillae, which later form the wedge-shaped part of the superior maxillary bones between the canine teeth in front

and the anterior palatine canals behind, are also ossified at birth. They give off the anterior nasal spine, which probably consists of contributions from each pre-maxillae, and is grooved in the middle. Behind this, according to Dr. Mosher, the pre-maxillae give off two wing-like processes, which in front fit into the notch in the nasal spine, themselves spreading out behind to receive the tip of the vomer. Thus the grooved anterior nasal spines, the pre-maxillary wings and the tip of the vomer "fit into each other like the sections of an old-fashioned trough" (Mosher)—the three constituent parts forming a groove into which the upper parts of the septum fit. The bodies of the pre-maxillary bones give origin to the four upper incisors and take their shape from the shape of the contained roots. As these roots are at first flat, the floor of the nasal vestibule is flat with the rest of the nasal floor. With the growth of the central incisor roots, the body of the pre-maxillary bone *covering* these roots is pushed upward, forming the incisor crest; this can be felt on the floor of the vestibule in the adult. During the first year, also, there are no nasal crests on the superior maxillary and palate bones, and the vomer rests directly on the nasal floor.

The vomer and perpendicular palate of the ethmoid develop in an entirely different manner. While the perpendicular plate develops by direct ossification of the primitive cartilage, the vomer develops in the perichondrium on each side, as two separate plates. These plates gradually fuse by absorption of the interlying cartilage, beginning at the bottom—but they are never completely fused together to the top. Even in the adult the vomer overlaps the quadrilateral cartilage to a considerable extent. The perpendicular plate of the ethmoid develops from a center separate from the rest of the ethmoid. It begins to ossify in the first year, but is not fused with the cribriform plate until the sixth year.

The period beginning about the sixth year of the child's life seems to mark the time of beginning of the forces and conditions which can cause septal deflections. About this time the perpendicular plate fuses with the cribriform plate. The septum is now set between the unyielding base of the cranium above, and the hard palate below. There is renewed activity in the growth of the quadrilateral cartilage from its anterior center behind the anterior nasal spine; while the pre-maxillary wings, (according to Mosher), increase rapidly in size; and the nasal crests of the superior maxillae and palate bones begin to rise beneath the vomer. As these various forces of growth meet and oppose each other, most of their force is expended along what is commonly called "the ridge" extending from the

anterior nasal spine backward along the upper (called anterior) slanting border of the vomer.

A combination of the papers of Dr. Harry P. Mosher, of Boston, in The Transactions of the American Laryngological, Rhinological and Otological Society for 1907, and that of Dr. Otto T. Freer, in *The Annals of Otology, Rhinology and Laryngology* for 1910, seems to give an excellent working understanding of septal deflections.

Freer states that each constituent part of the nasal septum has its own complete envelope of periosteum or perichondrium; so that these membranes do not spread out as a flat sheet over the septum, but the periosteum and the perichondrium pass through the suture lines to the other side—the perpendicular plate, vomer and quadrilateral cartilage each being enclosed in its own periosteum or perichondrium, like a card in an envelope. This explains the difficulty of passing with a blunt dissector under the periosteum from the quadrilateral cartilage to the perpendicular plate, or over the vomer ridge.

As stated before, the anterior nasal spine, the pre-maxillary wings (or sub-vomer bones) and the vomer, form a groove into which the perpendicular plate and quadrilateral cartilages are received. With the force of growth from above and below meeting here, ridges are often formed. In the front, the quadrilateral cartilage may push down one lip of this groove, growing down over it, forming a ridge composed of cartilage above and bone below. By the pressure of growth there may be much thickening, or the cartilage may slip entirely over the lip of the groove and grow all the way down to the nasal floor, forming ridges of varying combinations of cartilage and bone imbedded in adherent periosteum and fibrous tissue. Further back along the so-called ridge, the lips of the groove along the lower margin of the perpendicular plate and that on the vomer may be spread out together, forming sharp, bony ridges. Below this, again, the nasal crests of the superior maxillary and palate bones may be turned over almost flat on the nasal floor; still holding the muco-periosteal flap to one side, after most of the ridge has been removed. The necessity of having the muco-periosteum stretched between two points that are in the median line, in order to obtain a straight septum after a submucous resection, of course, requires these nasal crests to be also removed if deflected.

A tail-end of the quadrilateral cartilage may extend between the perpendicular plate and the vomer as far as their attachment to the sphenoid. Sometimes this tail-end, one-half inch wide, may be

entirely enclosed by the overlapping lips of the vomer and perpendicular plate, as in a specimen I have seen.

Traumatic deflections are said to be mostly vertical. A blow on the projecting tip of the nose may cause a vertical folding or fracture of the cartilage, or may displace it from the groove in which it rests along the floor. Blows on the nasal bones are carried down the perpendicular plate, because of its attachment to the nasal bones along their upper two-thirds.

Finally, the character of the septal mucous membrane is of importance in operative procedures upon it. The mucous membrane of the olfactory region, being situated where it is seldom torn, is not of special interest in this connection. The respiratory portion of the septum (and of the nose generally) is covered with ciliated columnar epithelium, containing numerous goblet cells, and with mucous glands extending into the submucosa. In injury of the mucosa (as by an incision or tear running backward over the ridge at right angles to the vertical incision) the lost epithelium is replaced *not* by ciliated columnar, but by squamous epithelium, on which afterward the mucous dries and scabs. Another factor which probably assists nasal drainage, is capillary action in the normal narrow spaces between the closely approximated turbinates and the septum. If by operation we remove a ridge where the turbinate has not been in contact or obstructing, we leave a wide open nostril, destroying the possibilities of this capillary action.

Anatomically and mechanically the best incision under ordinary circumstances for the submucous resection would seems to be one running down over the septal cartilage and across the floor of the nose in the skin-part of the vestibule. This makes the loosened muco-periosteal flap the hypothenuse of a right-angled triangle of which the floor and septum form, respectively, the base and the vertical side. This allows the muco-periosteal flap to be drawn away from the septum, while with a button-hole flap, room for operation is only obtained by the stretching of the flap. Also the lower end of the incision along the floor, being in the *skin* of the vestibule, will not scab after healing.

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VINCENT'S ANGINA IN CHILDREN.*

BY J. A. MULHOLLAND, M. D., NEW YORK CITY.

The present paper is based on the study of twenty-four cases of Vincent's angina occurring at the New York Foundling Hospital. Since Vincent, in 1896, described the peculiar type of ulceration in the pharynx, to which his name is given, and showed its origin to be due to a specific bacillus associated with a spirochete or spirillum, there have been many cases under observation at this hospital. The occurrence of these cases in groups at various times, suggested to the writer that an investigation as to the contagiousness of the disease might be of value in stamping it out of the wards of the institution. Accordingly, in June, 1911, with the co-operation of Dr. Joseph E. Kenefick, an investigation was begun. Our aim was to determine whether or not the disease was contagious, and if so, to what extent; and to compare our findings with those of other observers as to its frequency in males and females, adults and children. It was also hoped to develop a satisfactory line of treatment. The children in this hospital are all under 5 years old, but we have a number of nurses who are exposed equally with the children to whatever infection may exist. It may also be noted, for the purposes of this paper, that the hospital not only harbors several hundreds of children in its wards and nurseries, but also has under constant supervision other hundreds who are boarded out and who are required to report at frequent, stated intervals for physical examination. In this investigation no cases were considered except those in which the lesion was on the tonsil, pillars of the fauces or the soft palate, and the diagnosis in each case was confirmed by microscopical examination. Twenty-four such cases were discovered during the eight months covering the period of this study.

The New York Foundling Hospital, covering a whole square block, is divided into the hospital proper, containing all the medical and surgical cases, a large building given up to quarantine, and the nurseries devoted to the well children. The nurseries are six in number, all alike, large, (25x75 feet), with outside exposure and plenty of windows and sunshine. Each nursery is capable of hold-

*Read at the meeting of the Laryngological Section of the New York Academy of Medicine, December 27, 1911.

ing thirty-two children, with sixteen nurses. Now, we found that practically all of the cases of Vincent's angina came from one nursery—Number 3. The remaining five nurseries, although exactly the same as to sanitary conditions, etc., yielded no cases.

During the first six months there were twenty-three cases, all from the one focus. It was then suggested by Dr. Matthias Nicoll, visiting physician, that the nursery should be quarantined and that all cases of Vincent's angina should be treated exactly as if they had measles or scarlet. As a result of this measure, only one case developed in the two months following, and this occurred the first ten days of quarantine.

It is perhaps worth noting that none of the nurses contracted the disease. Several observers have called attention to its frequency in young adults, particularly in young male adults. Why the adult female should apparently possess comparative immunity, does not appear. Certainly as far as our cases in children are concerned, the disease attacked both sexes impartially. Another point worth noting is the fact that while there have been cases more or less constantly among the children in the hospital, in none of the fifteen hundred boarded out has the disease been found.

Our observations seem to prove that Vincent's angina is fairly contagious among children and that an institutional life favors its spread. At the same time, once the fact of the contagiousness is recognized, and proper measures taken, no difficulty should be experienced in stamping out the infection.

We divided our cases into two groups: Tonsillar and extra-tonsillar. The tonsillar type is most frequent, the point of election being a crypt in the upper part of the tonsil, just behind the anterior pillar. Dr. Wherry[1] suggests that this point is attacked because the drainage of the tonsillar crypts in this locality is very poor, and the specific micro-organisms find better lodgment and opportunity to develop here.

Yates[2] raised the same point in reporting a case of mastoiditis due to this infection. His belief is, that infection of the ear with Vincent's organism is never primary but always "owes its entry into the tympanum to the good offices of a preceding infection." That is to say, the organism requires as a soil tissues impaired by previous disease or low vitality. Whatever the reason for it may be, in our cases this has been the usual starting-point. During the first few days of the attack it may easily be mistaken for a peri-tonsillar inflammation, since the focus is often quite hidden by the anterior

pillar. Within a few days, however, the clinical picture changes. The whole of the affected area sloughs, leaving a deep, ragged, foul-smelling ulcer, having the same breadth from top to bottom. This odor has been thought by some to be characteristic. The ulcer is filled with a tough, false membrane, which usually disappears in two or three days, and leaves a clean, punched-out granulating surface, which heals in one or two weeks, under proper treatment.

In the extra-tonsillar type, the ulceration is confined to the mucous membrane of the pillar or soft palate. The edges of the ulcer are undermined, and there is an inflammatory areola around it with no infiltration of the surrounding tissues.

It may be remarked that these same organisms are found in stomatitis, and in noma, and that the same class of children are attacked with these various lesions, namely, badly nourished children, run down by previous illness. Noma and stomatitis are, however, purposely excluded from the present study.

Symptoms. The onset is sudden, and accompanied by sharp, lancinating pains on the affected side, difficulty of speech and swallowing; in fact, characterized by all the ear-marks of a quinsy. There is profound depression and exhaustion, without, however, any rise in temperature. This absence of febrile reaction, together with the sudden onset and marked evidences of toxemia, is a peculiar feature of the disease as observed in our cases, and seems to distinguish it from the other anginas. The above symptoms persist for two or three days, or until sloughing has taken place, and drainage established.

Prognosis as to life is good, so long as the infection is confined to the fauces. All our cases recovered except one, a child very much debilitated by a severe attack of measles,—who developed noma and died.

Diagnosis. Comparatively few of these cases are seen outside of institutions or else they are not recognized. While the clinical picture is fairly clear, one not familiar with the disease might easily confuse it with beginning peri-tonsillar abscess, follicular tonsillitis, diphtheria, streptococcus infection of the throat, or possibly lues. The ultimate diagnosis is, of course, settled by the microscope. The germs are difficult of cultivation in artificial media.

From quinsy this disease can be differentiated, even in the early stage, if search is made for the focus in the crypt. *Follicular* tonsillitis shows infection of several crypts, and there is a sharp rise in temperature. *Diphtheria* might be suspected in the membranous

stage of Vincent's angina, but the membrane is not the same, and culture and microscopic examination readily show the true diagnosis. *Syphilitic* ulcer runs an entirely different course, and the Wasserman test and the microscope will decide the diagnosis if any doubt exists. *Streptococcus* infection, with the formation of membrane, may sometimes be mistaken for Vincent's angina, but the temperature and culture will help to distinguish. *Treatment* has consisted, in our cases, in rest in bed, a light diet, and mild catharsis. Locally, curettement of the affected crypt has been practiced, using a cotton-wound applicator for this purpose. After the focus has been cleaned out and drainage established, silver nitrate, thirty grains to the ounce, is carried down to the base of the ulcer or pocket. Subsequently we have the throat cleansed out several times daily with pure hydrogen peroxide, and twice a day a thirty-grain solution of silver nitrate swabbed over the ulcerated surfaces. Under this plan of treatment, in conjunction with tonics, healing has been rapid and the cases have been cured in from two to three weeks.

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After a series of experiments on guinea pigs, the writer arrives at these conclusions: In the guinea pig an injury of the acoustic nerve-fibers above the vestibular ganglion is not followed by a descendant degeneration of the peripheral portion of the nerve. Wallache's law concerning the changes of the spinal nerves following an injury above the spinal ganglion therefore holds also good for the injury of the acoustic nerve above the vestibular ganglion. As far as the changes in the cochlear nerve are concerned, the author states that they are not to be considered as a simple secondary degeneration. GLOGAU.

LARGE PAPILLOMA OF THE EPIGLOTTIS REMOVED BY FULGURATION.

BY RICHARD H. JOHNSTON, M. D., BALTIMORE.

Mrs. N., 68 years old, was referred to me by Dr. J. E. Downes, for shortness of breath, especially on climbing steps. Examination of the larynx showed a large, cauliflower-like mass practically filling the supraglottic space. The tumor was light in color, covered with papillae and prevented a view of any portion of the vocal cords. The growth was so large that it was impossible to see its attachment. The patient thought the first symptom had appeared about eight months previously. Through the direct laryngoscope the greater part of the tumor was removed with Pfau's forceps. Hemorrhage was profuse and the patient had to be kept quiet in bed for twenty-four hours. Suspecting malignancy, I gave the growth to Mr. H. J. Maldies, pathologist to the Presbyterian Hospital. His report was papilloma with suspicious ingrowths at two places. A few days later by direct laryngoscopy the remains of the tumor could be seen attached to the right lower epiglottis just above the ary-epiglottic fold by a broad base. The high frequency spark was applied thoroughly through the laryngoscope. The marked blanching of the tissue was clearly seen. One week later the patient returned and only a few tags at the site of the tumor remained. A second application of the spark was given and at the end of another week no sign of the growth could be made out and the larynx appeared normal. It looks as if we were dealing with a benign papilloma despite the patient's age, but she will be watched for recurrence.

It would seem that fulguration has solved the problem of the treatment of multiple papillomata in children. If we can get these patients before the suffocative stage, it will be a comparatively easy matter to apply the spark through the direct laryngoscope. Even if one has to do a tracheotomy, the chances are that the tube can soon be dispensed with.

While on the subject of papilloma I wish to cite briefly a case of multiple tumors in a child which ran an unusually favorable course. The patient was a boy, 19 months old, referred to me by Dr. A. M. Shipley, for aphonia and attacks of cyanosis particularly when crying. The mother stated that she had noticed some hoarseness eight

months before, which had grown progressively worse. The larynx was examined by direct laryngoscopy with the head straight on the table. The instrument used was the Jackson old child-speculum which is more suitable for babies than the separable tube. No anesthetic was used; the child was held, the speculum introduced, the larynx quickly exposed and a diagnosis of multiple papillomata made. The growth were immediately attacked with Pfau's forceps and the greater portion removed. Despite the small larynx, no untoward symptoms developed. From time to time the operation was repeated until only a few tags remained on the vocal cords. Applications of alcohol quickly removed these and by January, 1912, four months after beginning treatment, all symptoms had disappeared and the larynx presented a normal appearance. The patient had been examined several times since and there is no sign of recurrence. The points of special interest about the case are the ease with which operations can be performed with the head straight and the promptness with which the growths disappeared.

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Acute Mastoiditis Complicated by Tic Douloureaux. G. H. Powers, *Boston Med. and Surg. Jour.*, March, 1912, p. 380.

A normal, healthy man of 28 years developed an acute otitis media demanding paracentesis. A peculiarity was that gentle wiping of the canal brought on intense paroxysms of pain over different points in the neighborhod of the ear, externally, described as boring pains. These would frequently last all night. A mastoiditis developed which subsided under treatment, to return, and mastoid operation was performed, resulting in a normal convalescence and cure. But this peculiarly localized pain on wiping the canal, though it was absent for seven days, returned with increasing force, and continued to give trouble. Finally an impacted wisdom tooth was chiselled away as a possible cause. Relief did not come at once, but the pain ultimately disappeared, not to return.

BERRY (MOSHER.)

RELATION OF DISEASES OF THE POSTERIOR SINUSES TO PAINFUL CONDITIONS OF THE EAR.*

BY J. H. BRYAN, M. D., WASHINGTON, D. C.

Earache, resulting from some irritation in the course of the dental nerve, such as dentition in the infant, or caries, or inflamed nerves in those who have passed the eruptive period of teething, has been known for a long time, but pain in the ear as a result of reflex irritation in consequence of some diseased condition of the posterior sinuses, is a subject of which I find no mention made, neither in the literature on diseases of the sinuses, nor in that on diseases of the ear. The only author whose writings I am familiar with, who has alluded to this subject at all, is St. Clair Thomson, and he mentions severe earache as a prominent symptom in a report of one of his cases of abscess of the sphenoid sinus. It seems strange that after so much work has been done in recent years on diseases of the accessory sinuses, that no mention of this condition has been made. If other observers have met with these painful conditions of the ear resulting from sinus disease they have either not taken the trouble to record their observations, or have done so in such an obscure way as not to attract attention.

A study of the anatomy of the nose and naso-pharynx shows this region very rich in sympathetic nerves. We find two important ganglia or stations which serve to receive and transmit impressions, not only to the forward part of the nose, but also to the pharynx and to the ear. The spheno-palatine ganglion, also known as Meckel's, is found in the upper part of the spheno-maxillary fossa, lying just under the sphenoid sinus. This ganglion has for one of its main branches the vidian which is made by the union of the great superficial petrosal and the great deep petrosal nerves. As the vidian passes through the canal of the same name it gives off one or more branches to the otic ganglion, which lies on a lower level and on a plane posterior to the sphenoidal sinus. This is Arnold's ganglion, and is situated just below the foramen ovale. This ganglion throws off several branches to the mouth of the Eustachian tube, and also one or two filaments which inosculate with the auriculo-temporal nerve and a communicating branch to

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the corda tympani. With such an intricate, and at the same time, intimate relation between these two sympathetic ganglia, it is easily understood how irritations resulting from pathologic conditions located in the deeper part of the head, such as in the neighborhood of the sphenoidal sinus and the post-ethmoidal cells can have painful impressions carried to some distant part, such as the middle-ear, with which they have no direct relation. Cases in which earache is a symptom of posterior sinus diseases are undoubtedly rare, but they, according to my experience, occur sufficiently often to make a record of them desirable. The pain is simply reflex in character, and does not depend upon any pathologic condition present in the ear. In the several cases that have come under my observation, I have found nothing more than a very moderate form of chronic catarrhal inflammation, and even that has only been present in two of my cases.

Case 1. Patient with chronic suppurating frontal, ethmoidal, maxillary, and sphenoidal sinusitis, complained of earache. This woman, middle-aged, consulted me, complaining of severe pain in the right ear, which she stated had been going on for several months with varying intensity. She complained of morning nausea and vertigo, but no tinnitus. H. D. W. R. 40/40. Examination showed right membrana tympani normal in color and with normal light-reflex. Examination of the nose showed right nasal chamber containing a large quantity of pus in the middle meatus, passing down into the post-nasal space; the middle turbinates were also enlarged. The probe revealed caries in the anterior and middle ethmoidal region. Pressure over the supra- and infra-orbital ridges elicited severe pain. The electric light test showed the right side dark, while those on the left side were translucent. Farther questioning elicited the fact that for a number of years she had severe frontal headaches, and for eight or ten years she had been conscious of a catarrhal condition of the nose, but having failed to get relief, she had ceased to complain of them. The earache, however, which had appeared recently, was causing her great distress.

She was informed that the ear was in a normal condition, and that the earache was due to the trouble in the sinuses, and that her condition was a serious one and that an operation was imperative. Several days before resorting to the major operation, the middle turbinate was removed under local anesthesia, and in doing so a large part of the middle and posterior cells were removed, exposing the sphenoidal sinus, which was found to be filled with pus. The

improved drainage resulting from this operation afforded her great relief, with almost complete cessation of the pain in the ear. Within a few days, however, the pain in the head returned with such intensity that she readily submitted to the external operation. The frontal sinus was opened and nearly the whole of the anterior wall removed. The cavity was filled with pus and granulation tissue. After cleaning out the cavity, it was found to be the seat of extensive caries, and a large part of the posterior wall of the sinus had to be removed, exposing the dura to a considerable extent. The ethmoidal cells and the anterior wall of the right sphenoidal sinus were removed and the parts freely curetted. The frontal sinus and the ethmoidal and sphenoidal regions were packed with iodoform gauze, and the external wound closed. This patient made a slow but uninterrupted recovery. With the complete healing of the parts the reflex pain in the ear subsided, and she has not referred to the pain in the ear since.

Case 2. Chronic suppurating frontal, ethmoidal, sphenoidal sinusitis, on the right side, accompanied by severe pain in the corresponding ear before and after the operation. This case, a well-nourished man of about 40 years, consulted me for severe headache referred to the right frontal region, and also pain in the corresponding ear. Examination showed right side of nose filled with purulent secretion, and marked swelling of the middle turbinate, nearly closing this side of the nose. The probe revealed extensive caries of the anterior and middle ethmoidal cells on the right side. The electric light test showed all the cavities on the right side dark, while those on the corresponding side were translucent. Irrigation of right antrum brought away a large quantity of pus resulting from a drainage from the cavities above. Examination of the ears showed nothing abnormal except an undue retraction of the right membrana tympani. Hearing distance normal in both sides. The patient stated that the pain in the ear was of recent origin but had been growing more severe of late.

As a preliminary to the external operation the right middle turbinate was removed under cocain anesthesia, and after its removal there was found to exist extensive disease of the posterior ethmoidal cells and the sphenoidal sinus. The radical operation was then resorted to, the whole of the anterior wall of the frontal sinus was removed, as well as a part of its floor, and the whole of the ethmoidal cells as far back as the sphenoid. This cavity was then opened and the anterior wall and part of its floor removed. The

frontal and the sphenoidal sinuses were found to be filled with thick, fetid pus, and the whole of the ethmoid cells were in a necrotic state. After thoroughly cleansing the parts, the cavities were packed with iodoform gauze and the external wound closed in the usual manner. For several days the patient complained of intense pain in the ear, examination of which showed nothing abnormal. Hot applications to the ear and moderate doses of morphia were required for several days when the pain suddenly ceased. This patient made an uninterrupted and quick recovery, being entirely relieved of the sinus disease and all painful symptoms referred to the ear.

Case 3. Chronic suppurating pan-sinusitis followed by membranous closure of the left sphenoidal sinus and accompanied by painful sensation in the left ear when the sinus becomes air-bound. It would be tedious to go into the details of this long and troublesome case, and I shall refer only to that part which relates to the sphenoidal disease and the subsequent earaches. The sphenoidal cavities in this case were irregular and abnormally placed. On the left side, the one that has been followed by ear-sequelae, there was a fairly well-developed sinus located in the upper part of the body of the sphenoidal bone. This cavity was opened by the endo-nasal route and found to be badly diseased. The whole of the anterior wall was removed by means of a cutting-forceps. The relief from the symptoms due to the sphenoidal disease was very great, but in the course of time a membranous closure of the cavity took place, a condition which occasionally follows this operation, and from time to time there is an almost complete closure of the cavity. In spite of the numerous attempts to produce a large permanent opening in the sinus the membrane is always reproduced, and when the closure becomes so marked as to produce an air-bound cavity there is nearly always a reflex pain in the corresponding ear resulting.

The sinus itself has remained free from disease since the operation except when she has had an attack of influenza. At such times it becomes inflamed, but this condition readily passes off under treatment. There is a moderate degree of chronic catarrhal inflammation of the left middle-ear, the membrana tympani showing some retraction, thickening and loss of luster. The hearing-distance is about ten inches below normal. When she has these periodical attacks of earache, enlarging the opening in the sinus and inflating the ear with the Eustachian catheter gives almost instant relief.

On the right side the condition has been entirely different, there has been no pain referred to the ear, but she has almost constant

trigeminal neuralgia, the pain being referred principally to the supra- and infra-orbital region, more especially to the infra-orbital ridge near the internal angle. All efforts to reach this sinus by the endo-nasal route failed, as well as the several attempts to reach it through the maxillary route. About eighteen months ago, certain eye-symptoms developed which necessitated a radical operation being done. At this operation the whole of the ethmoidal cells, including the inner wall of the orbit, were removed as far back as the sphenoid bone. A moderate-sized sphenoidal sinus was found in the most dependent part of the body of the bone and dipping down into the pterygoid process. This is the only case that I have met with clinically that corresponds with an anatomical preparation which I showed some years ago at a meeting of the American Laryngological Association, in which the sphenoid sinus extended some distance into the pterygoid process. The eye-symptoms were completely relieved by this operation, but the neuralgic symptoms continue, and from time to time are most distressing. A rather complete history from the sphenoidal side of this case is given in order to show how in one side there may be marked reflex-pain in the ear, while on the other side the pain is not referred to the ear at all, but follows the course of the trigeminal nerve.

My purpose in bringing this subject before you is to demonstrate a condition which I believe has been overlooked, or not sufficiently considered. I have seen several other cases of persistent earache, in the practice of other men, in which the sinus side of the question had been overlooked, and as soon as the disease in the posterior sinus had been relieved the painful condition of the ear subsided. Trigeminal neuralgia resulting from sphenoidal disease has been recognized for some time, and Sluder, in several valuable communications, has lucidly demonstrated this, but the reflex-pain in the ears, due to the irritation of the vidian nerve, which courses along the inferior border of an ordinarily well-developed sphenoid sinus, is a subject to which we, as aurists and rhinologists, have not given enough attention.

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A CASE OF AFEBRILE SINUS THROMBOSIS AND CEREBELLAR ABSCESS COMPLICATING ACUTE OTITIS MEDIA IN AN ADULT.

BY JULIUS AUERBACH, M. D., NEW YORK CITY.

The following case is illustrative of the difficulties sometimes attending the diagnosis of intra-cranial complications of acute otitis media, and so presents many interesting features which seem to make it worth reporting.

Man, aged 51; previous health good until May 12, 1912, when I was called in consultation by Dr. L. Lewis, of New York City. One week previously, patient had vague pains throughout the body, loss of appetite, slight soreness of throat, slight nasal discharge. Diagnosis of influenza was made by the family physician. Three days before I was called, patient complained of shooting pains in his right ear, which continued until my visit. No history of headache, chill, vomiting nor disturbance of equilibrium.

Status praesens: Well-nourished man, sitting up apparently comfortable; heart and lungs negative, spleen not felt. Otoscopic examination: Left ear: normal. Right ear: Redness of membrana tympani; bulging of Schrapnell's membrane; landmarks indistinct; tenderness on deep pressure over the tip and posterior border of the mastoid but not over the antrum. Percussion over the entire temporal region elicited no tenderness, but tenderness was present on the right side of the neck, beginning at the angle of the jaw and extending down the anterior border of the sterno-cleido-mastoid for two-thirds of its extent. Pulse 66, temperature 99°. Pupils equal and react to light and accommodation. No rigidity of the neck; no Kernig; mental condition good; no Romberg.

Functional tests: Left ear normal. Right ear: Conversation speech, 3 meters (with Bárány app.); whispered speech, ½ meter. Rinné negative; Schwabach lengthened; large C1 fork not heard; large C4 heard; Galton whistle heard; spontaneous nystagmus absent; equilibrium not disturbed. Diagnosis: Otitis media purulent acuta dextra, with possible intra-cranial complication.

Treatment: Incision of drum membrane, ice-bag over mastoid and neck, rest in bed, 5 gr. of asperin q. 3h., hot aural irrigations of boric acid solution q. 2h.

May 13: Patient reported comfortable by family physician: drainage from ear not good; tenderness over tip, posterior of mastoid and along the course of the jugular, but less marked than at previous examination.

May 15: I was again called. Patient complained of shooting pains in the right ear, which awoke him during the night. Temperature normal, pulse 66. I could not ascertain whether this pulse-rate was normal for this patient. No headache, dizziness, vomiting nor disturbance of equilibrium; spontaneous nystagmus absent. Through the incision in the drum I could see pulsation but no pus; I therefore enlarged the incision; found no mastoid tenderness on this date. Nothing heard from patient until May 19, when he came to my office with profuse purulent discharge from the ear. He did not complain of headache, vomiting nor dizziness; mastoid not tender; labyrinth functionating. Upon close questioning patient admitted that he felt drowsy. Temperature 99°; pulse 68; looked sick but symptoms nil, save for the drowsiness; memory good; all questions answered quickly and correctly. Not seen again until May 22, when he came to my office. Drainage good, no tenderness, no pain, felt well in every way.

May 26: Temperature 99°; pulse 72. No marked change in the hearing; no spontaneous nystagmus; no subjective symptoms. but his general appearance was not good.

May 27: Temperature 100°; pulse 84. No mastoid tenderness, no pain, no swelling. It is at this point that a marked change for the worse was seen. In general appearance the man had changed within twenty-four hours from a fairly healthy-looking individual to an almost emaciated-looking man: apathy marked. It is here also that the first rise of temperature and pulse-rate were noticed. I decided that we had here a possible brain abscess just passing from the latent stage into an active one. Immediate operation advised.

May 28: Operation at 2 p. m., Dr. I. W. Voorhees assisting. Usual mastoid incision; bony cortex healthy, entire mastoid sclerotic, antrum deeply placed and surrounded by eburnated bone and filled with granulations. Dura of middle fossa exposed and found covered with granulations; these were removed until healthy-looking dura was seen. From absence of all symptoms pointing to cerebellar disease, and from the healthy appearance of the bone covering the sinus, I did not deem it advisable to expose either the abscess or the sinus. Patient spent a comfortable night, but in the

morning complained of severe frontal headache. Temperature 101°; pulse 84. Slight spontaneous nystagmus (rotatory) to the right; felt nauseated but did not vomit.

May 29: Severe pain over the entire head. Temperature 102°; pulse 90. Change of entire dressing; wound clean, no odor, very restless during the entire day, with headache increasing.

May 30: In the morning had a chill; temperature 103°, pulse 108. Slight opisthotonous; Kernig marked; pupils contracted, regular. Operation at 2 p. m., Dr. S. L. Craig assisting; entire wound enlarged, middle fossa widely exposed; dura a dirty gray; incised, no pus. Search for abscess in the temporo-sphenoidal lobe disclosed no pus. Sinus exposed, found thrombosed and black throughout; did not encounter healthy sinus till torcula was reached; sinus wall very thick; free bleeding from the emissary vein and from the superior petrosal sinus. Upon examination of the posterior fossa my probe passed into an abscess cavity into which I could introduce my index finger; pus found. Internal jugular found adherent: ligated and left in situ; both wounds dressed; hot saline and whiskey per rectum; 10 p. m., exitus letalis, with all the symptoms of a diffuse meningitis; temperature before death 108°.

REMARKS.

The above described case may be divided into three stages:

In the first stage, with the beginning of the middle-ear suppuration, the picture was one of an atypical case of acute otitis media; the normal temperature, the slow pulse, the tenderness along the course of the jugular, all were suggestive of an endo-cranial complication.

With these few symptoms it was impossible to say with any degree of accuracy, what particular complication one had to deal with; for the symptoms of one condition might be masked by another. The diagnosis of endo-cranial complication becomes a legitimate one, provided a complication is recognized, and the exact condition can then be cleared up on the operating table. The procedure is analogous to the exploratory laparotomy of the abdominal surgeon.

Following the paracentesis and the establishment of free drainage, the patient found himself in fairly good condition; the pain, the mastoid tenderness, the pain along the course of the jugular all disappeared; there was no headache, his mental condition was good. The pulse, however, remained continually slow; when, 14 days after the onset, it rose to 72 and the temperature to 99°; not much of a

rise, it is true, but, taken together with sudden change in the appearance of the man, I concluded that he was passing from the latent stage of brain abscess into the manifest one.

The diagnosis of sinus thrombosis, while it might have been made earlier in the course of the disease by the presence of tenderness behind the posterior border of the mastoid and along the course of the jugular, could no longer be entertained, as the above symptoms disappeared and at no time was there a rise in temperature; it is this feature which makes the case extremely interesting; because, of all symptoms associated with sinus thrombosis, the characteristic temperature curve is the most constant.

Schroeder (*Zeitschrift fuer Ohrenheilkunde,* Vol. 52, 1906) reports a case of afebrile sinus thrombosis which ended in recovery after running a feverless course for four weeks. G. Alexander reports a similar case in which granulations of 3 mm. in thickness covered the dura. Both of these were cases of long-standing suppuration, and Nature did its share to prevent the propagation of the virus to the meninges.

The second stage, dating from the first operation, also presents many interesting features; the few local mastoid symptoms are explained by the thick sclerotic mastoid found on operation; the dura of the middle fossa over the antrum, with the exception of a few granulations, was found healthy, but the exposure was not wide enough. From the absence of chills since the beginning of the disease, from absence of all signs of sepsis, and from the appearance of the mastoid itself, I did not deem it wise to expose the sinus, though seen in retrospect it should have been done. After passing a fairly comfortable night, the patient awoke with severe pain in the entire head. Temperature 102°, pulse 90. The steady rise in the temperature, the increased severity of the headache, and within another twenty-four hours stiffness of the neck and marked Kernig all show the rapidity with which the infection spread.

The second operation was undertaken within forty-eight hours after the first, and only by wide exposure of the middle and posterior fossae was the exact state of affairs disclosed.

It is remarkable that such an extensive endo-cranial involvement should have given rise to so few symptoms up to forty-eight hours before death. To be noted, too, is the increased severity of all the symptoms after the first operation, so that all signs of a diffuse meningitis were present within twenty-four hours. It is unusual, also, for the labyrinth to remain functionating in both the vestibular and cochlear portions. This absence of all symp-

toms pointing to cerebellar disease makes the case of extreme interest.

Politzer mentions two cases of cerebellar abscess that gave no symptoms during life and ended suddenly in death as the patients were trying to sit up in bed. (Politzer: "Diseases of the Ear," Fifth edition, page 642).

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Experimental Studies on the Acoustic Injury of the Mammalian Labyrinth. H. HOESSLI. *Ztschr. f. Ohrenh. u. f. Krankh. d. Luftw.*, Bd. 64, Heft 2, 1912, p. 101.

In a series of experiments different mammals (guinea-pigs, cats, monkeys and dogs) were subjected to acoustic trauma in the following way: (1) air-conduction (an automatic whistle, blown under an average pressure of 5 mm. Hg., passing through the cage, without touching the latter and being separated from the animal by a net of wire); (2) bone-conduction (the animals were put into an iron tube which was suspended on strings in front of a waterwork, the wheel of the latter causing four hammers to beat continuously on the tube. In some of the animals, the stapes was removed unilaterally, to exclude air-conduction by all means); (3) detonation (the pistols were fired at such a distance from the ear as not to cause a traumatic rupture of the drum. In some of the animals the stapes was removed and the canal plugged with cotton. After having been subjected to the acoustic injury for a certain time, the animals were killed and their labyrinth examined microscopically).

The writer comes to the following conclusions: 1. The degenerative process in acoustic trauma always starts within the endorgan, the hair cell, then progresses to the rest of the neuron and only secondarily attacks the supporting apparatus and the membranous labyrinth. 2. The plasma globules found in the microscopic specimen are either artificial products, caused by retarded fixation or of traumatic origin in cases of strong detonation. 3. Tones of the same pitch cause in different animals a similar cochlear lesion, the seat of the latter being the lower the higher the tone. 4. The purpose of the ossicular chain is that of conducting and not of dulling the sound. 5. Acoustic injury of the labyrinth is brought about by means of the air-conduction exclusively. GLOGAU.

VINCENT'S ANGINA: ITS FREQUENCY AND THE IMPORTANCE OF ITS RECOGNITION. REPORTS OF TWO FATAL CASES.*

BY THOMAS H. HALSTED, M. D., SYRACUSE, N. Y.

Since the discovery of the cause of Vincent's angina there has been much difference of opinion among bacteriologists as to whether the specific organisms, the fusiform bacillus and the accompanying spirochete or spirillum were in reality two distinct organisms living in symbiosis, or simply one, the fusiform bacillus, the spirochete or spirillum being merely evolutionary forms of the former, but always found present with the bacillus. The latter view seems to have been definitely proved by Tunnicliffe and others.

This bacillus, producing a pseudo-membranous ulceration of the throat and mouth, is not limited in its field of activity, however, to these parts. While it is the infective organism in Vincent's angina and in noma, it has also been found as the specific cause of reported cases of laryngitis, bronchitis, broncho-pneumonia, pneumonia, and mastoiditis. It causes hospital gangrene, and has been found as the etiological factor in phagadenic ulcers of the penis and genitalia, in abscesses of the lung and spleen, and in a case recently reported by Tunnicliffe,[1] the fusiform bacillus was the pathogenic agent throughout in a case of general pyemia, with multiple abscesses in various parts and organs of the body following an appendicitis. It is quite apparent, therefore, that Vincent's angina is merely the local manifestation in the upper respiratory tract of the pathogenic activity of a specific organism which is frequently active in all parts of the body.

The fusiform bacillus as well as the spirochete form is anaerobic, but occurs in association nearly always with aerobic bacteria—the streptococcus, staphylococcus, pneumococcus, bacillus of diphtheria, and other pathogenic or non-pathogenic organisms. Like the other organisms with which it is found associated, it occurs in healthy mouths, but perhaps more particularly in mouths and throats in which there is some unhealthy condition, such as diseased tonsils, decaying teeth, and inflamed gums. Its habitat is especially about and around bad and unclean teeth. It rarely produces disease when the tonsils, teeth and mucous membranes are in a normal condition,

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but occurs secondarily to some pre-existing pathological condition of these parts, or when the individual's general health is such that his resistance is greatly lowered.

The typical lesion produced on a mucous membrane by the fusiform bacillus when it causes disease is a pseudo-membranous ulceration. A pseudo-membrane in the throat is produced not only by the fusiform bacillus, but by the diphtheria bacillus, the streptococcus, staphylococcus, pneumococcus, micrococcus catarrhalis, bacillus coli, and other organisms, and in nearly every pseudo-membranous inflammation there are two or more of these organisms present—a mixed infection being nearly always the rule. Consequently we have Vincent's angina present with diphtheria, in scarlet fever, in measles, or with syphilitic lesions of the throat, or with other non-diphtheritic pseudo-membranous inflammations produced by the streptococcus, the staphylococcus, or other organisms. In the majority of such cases of mixed infection the organisms of Vincent's angina, while they might be the predominating ones, and the actual cause of the disease, are usually entirely overlooked because they do not grow on the ordinary culture media used in examination for the pathogenic organisms. They are discovered only by direct examination of the smear made from the swab or curettage of the ulcer or membrane. In other words, to discover which of these various pseudo-membrane producing germs is the predominating one and the cause of the disease, it is necessary to examine the smear from the swab, as well as the culture—otherwise Vincent's angina will be entirely overlooked by the bacteriologist. The usual method of bacteriological examination for suspected diphtheria in American municipal laboratories is to examine the culture only, not the smear. Hence the reported rarity of Vincent's angina.

Errors in the diagnosis are constantly made by competent physicians, the error consisting in mistaking Vincent's angina for diphtheria, or in mistaking an ulceration of Vincent's angina for a mucous patch, a gummatous ulceration or even a chancre of the tonsil. A third error that is frequently made is in not recognizing the deep and sometimes gangrenous ulcerations of the tonsil and mouth that occur in the late stages of scarlet fever and diphtheria as due to the fusiform bacillus of Vincent's angina rather than to the streptococcus or the Klebs-Loeffler bacillus of the original disease.

Vincent's angina has been regarded as a comparatively rare disease as compared with other pseudo-membranous inflammations of the throat. Rolleston[2] says that of 18,187 cases of suspected diph-

theria admitted to the Metropolitan Asylums Board Hospital (London), during the years 1905-1907, 3,047 were proved after admission not to be diphtheria. Of these latter non-diphtheritic cases, 95 only were Vincent's angina, i. e., this disease was present in but 0.5 per cent of all forms of membranous anginas and in but 3.1 per cent of the non-diphtheritic anginas. At the Grove Hospital (Contagious Diseases), Vincent's angina was present in 0.9 per cent of all membranous anginas and in 4.9 per cent of the non-diphtheritic cases. Vincent found it present in 2.2 per cent of all cases, while A. Meyer, out of 15,000 cases of ear and throat diseases at Heymann's Clinic in Berlin, saw but 30 cases. On the other hand, Lublowitz found the organism in 6 out of 38 cases of ulcerative stomatitis, Beitzke in 5 out of 58 cases of suspected diphtheria, while Rodella found the organisms in about one-third of the pseudomembranous anginas which he examined. Of the last 2,500 cases of all kinds of ear, nose and throat diseases, seen in private practice by the writer, 20, or one in 125, have been cases of Vincent's angina, the diagnosis being confirmed by bacteriological (smear) examination, and of these cases the majority have been of the type in which the lesion resembles syphilis rather than diphtheria.

That the type of Vincent's angina, resembling diphtheria clinically, is altogether more common than the foregoing statistics would indicate seems to be shown by statistics from the Michigan State Board of Health Bacteriological Laboratory. Dr. M. L. Holm,[3] their bacteriologist, reports that in 1909-1910, out of 687 swabs sent in by physicians for examination for suspected diphtheria, 242 cases, or 28%, were proved bacteriologically to be diphtheria, while it was absent in 445 cases. Of these remaining non-diphtheritic anginas, 178 were shown to be Vincent's angina bacteriologically, i. e., in this number the fusiform bacilli with the spirilla were the predominating organisms, the other organisms, in the order of their predominance being the staphylococcus, the streptococcus, and the pneumococcus. Of the 687 swabs sent in for examination, a positive clinical diagnosis of diphtheria had been made in 224 cases, but the bacteriological examination proved the presence of diphtheria in but 120 cases, and of the remaining 104 cases, 46 were proved to be Vincent's angina. Other species of organisms were always found associated with the fusiform bacillus, but in all these cases it was the organism found to predominate. In all these cases, examinations were made directly from the swab on smears, and from the swab on cultures, the fusiform bacillus being found only in the smears, never in the cultures, as they do not grow on the

ordinary diphtheria culture media. This latter fact accounts for their being so often overlooked.

There are two distinct clinical types of the disease. In the first type, the disease is to be differentiated from diphtheria and other non-diphtheritic pseudo-membranous anginas. The local symptoms are much more severe than the constitutional. There is much pain in swallowing, with a pronounced fetor to the breath. The temperature is normal or slightly elevated. On examination there is a pseudo-membrane covering an ulceration of one or both tonsils; it may extend up the pillar to the uvula and cover the soft palate. The membrane quickly reforms. As a rule, there is an accompanying membranous stomatitis especially of the alveolus. The membrane is grayish, or yellowish gray in color, more friable than that of diphtheria perhaps, but is often entirely indistinguishable to the eye from that of diphtheria. Edema of the soft palate and uvula is often present. There is a marked tendency to necrosis and destruction of parts, as for instance, the tonsils and uvula, and unlike diphtheria, cicatrization is likely to follow healing. The writer had one such case where the uvula was completely destroyed, a deforming cicatrization of the velum palati following. The pseudo-membrane continues for a period varying from a few days to several weeks, the average being, in thirty-two cases reported by Rolleston, eighteen days.

Dr. Woody, of the Philadelphia Hospital for Contagious Diseases, says that Vincent's angina is especially severe as a secondary affection, following diphtheria, scarlet fever, and especially measles. He says, as reported in an excellent article by E. H. Place:[4] "The disease in secondary cases is characterized by little elevation of temperature, but with rapid, feeble pulse; profound prostration, excited nervous system, irritability, wakefulness, tremor, and frequently in later stages with the Hippocratic facies and death in a brief period, from toxemia or exhaustion. The odor is characteristic, with salivation and moderate cervical entumefaction, and the spongy, friable and readily bleeding gums are almost invariably present, in some cases simulating scurvy. In severe cases, necrosis is very rapid, tissues melting away, destroying large area in an incredibly short time." Such cases, I am sure, every practitioner of many years' experience has certainly seen duplicated in scarlet fever and late diphtherias. Had such cases been examined bacteriologically, they would have been discovered to be Vincent's angina secondary to scarlet fever and diphtheria. That is to say, these deep, necrosing ulcerations were not due to the strepto-

coccus and the staphylococcus which was present in the scarlet fever, but to the fusiform bacillus and the spirochetes.

During the past winter the writer saw in consultation the following case, which closely resembled diphtheria, and terminated fatally:

Mrs. H., aged 41; pregnant eight months. Her physician, Dr. Chase, of E. Syracuse, was called to see her first on January 2, 1912, for what appeared to be bleeding hemorrhoids. No examination was made, but there was a bloody discharge from the rectum. An adrenalin suppository was prescribed and the bleeding soon ceased. He did not see the patient again for two weeks, when he was called because of a supposed quinsy, of which she had recurrent attacks. There was much pain in swallowing and at the angle of the jaw. The neck was swollen on both sides. Temperature 101° F. In a few days the quinsy ruptured spontaneously, the discharge being very profuse and accompanied by an unusually foul odor.

On February 9, Dr. Chase called me in consultation. The patient was very weak, semi-comatose, difficult to arouse, pulse rapid, skin of a peculiar saffron color; she could hardly speak or swallow, and was suffering from some dyspnea, due in part to her eight months' pregnancy. The odor of the breath was very fetid and offensive,—temperature normal. On examination with reflected light, a thick, grayish-yellow membrane was seen completely covering the tonsils, soft palate, uvula and the buccal mucous membrane on both sides around the margins of the teeth and gums and inside the lips. A more extensive pseudo-membrane I had never seen. There was a pseudo-membrane in the vagina, which disappeared a week later. I gave it as my opinion that the disease was diphtheria, remarking however, on the possibility of its being Vincent's angina. A culture was made. Anti-toxin was advised and later in the day it was given by Dr. Chase. The City Laboratory reported next morning that the culture was negative. On the following day Dr. Chase made another culture, and on my suggestion a swab for smear for Vincent's angina. Both were reported negative. Cultures were made on the two following days, all reported negative for diphtheria. On the fourth day after my first consultation, I saw the patient for the second time, taking with me Dr. Waldorf, pathologist to the Women's and Children's Hospital. The patient was in practically the same condition as on the previous visit. I curetted gently the mucous membrane under the edge of the pseudo-membrane, making several smears, which were later in the day examined by Drs. Groat and Waldorf, who found that the fusiform bacilli

and spirochetes of Vincent's angina were the predominating organisms and were present in large numbers. A positive diagnosis of Vincent's angina was made. The patient had received 28,000 units anti-toxin and 40 cc. anti-streptococcic serum, without local effect on the membrane, though she always felt better after the injections. Locally tr. iodin was applied, the mouth cleansed with a boric acid solution, and orthoform tablets to relieve pain were used—all without appreciable effect. Strychnin and other tonic treatment was given throughout. I did not see the patient after my second visit on February 12, 1912, but Dr. Chase reports that on several occasions the membrane nearly disappeared, only to recur, that the odor became steadily more offensive, and her general condition weaker, with increasing difficulty in taking nourishment. On March 2, about six weeks after her first throat symptoms, she entered labor, and fifteen minutes later, as the head reached the perineum, she suddenly collapsed and died before delivery could be accomplished. The prominent symptoms were the general toxic condition of the patient, which was very great, extreme prostration, foul fetid odor, peculiar saffron color and greenish cast to the skin, together with great pain in swallowing interfering with nourishment and sleep, the extensive pseudo-membrane covering the mucous membrane of mouth, tongue, throat, and its rapid reformation after removal.

In the second type of Vincent's angina, a purely local and quite limited ulcer or ulceration simulating very closely the throat lesions of syphilis is present. The ulcers, covered with a pseudo-membrane, may be single or multiple, superficial or deep, resembling either the mucous patch or the tertiary ulcer, and occur most commonly on one or both tonsils. The writer had a case in which the ulcer resembled the primary lesion of syphilis. In one case there were ulcerations on the post-pharyngeal wall and in the larynx. Necrosis followed by cicatrization occurs. The glands are likely to be tender and swollen. Pain is generally quite marked, and the breath is bad. The general health may not be much impaired. A history of previous, similar attacks is often obtained. A positive diagnosis can be made only by a bacteriological examination of the smear, although the clinical diagnosis in this type of the disease is simpler than in that type resembling diphtheria. There was in many of the cases a similar ulceration along the posterior alveolar borders, along the edges of the teeth, some of which were usually decayed, the cavities filled with a foul, thick mass of cheesy pus. In one case improvement of the tonsillar ulceration only took

place after the teeth and the alveolar ulcerations were thoroughly cleansed and treated, and some of the teeth extracted. This class of cases does not resemble diphtheria, but the diagnosis is to be differentiated from syphilis, secondary or tertiary. Unless one is careful, an error in diagnosis will be made if one rely too much on a history of syphilis in the individual, because Vincent's angina may occur in a syphilitic. Indeed, a differential diagnosis may even have to be made from a chancre, as for instance, a chancre of a tonsil which is usually accompanied with great swelling, and induration of the cervical gland. In these mild cases simulating syphilis, recurrence is, in the writer's limited experience, a very marked characteristic.

These cases apparently occur equally in both sexes and at all ages. Most frequently, perhaps, under 18 years of age, in the type most closely resembling diphtheria; whereas, in the other type where local ulcerations, resembling syphilis, are seen, the age is rather that of adult life.

There does not appear to be any question but that the disease is contagious, although perhaps mildly so. Several epidemics occurring in institutions have been reported. The disease is usually conveyed through drinking utensils, the common use of a pipe, and possibly through surgical or dental instruments.

The previous life of the patient has doubtless a bearing on the development of the disease. An impairment of the general health predisposes one who is harboring the disease bacilli in the mouth to local infection. The presence of decaying teeth and a general oral sepsis, or diseased tonsils would predispose to attack.

There is every reason to believe that fatalities are not so rare as reports of cases might indicate. That the disease has been almost entirely overlooked in differentiating it from diphtheria, has been pretty conclusively proved by Holm, as referred to earlier in this paper. Without doubt, many of the fatalities due to so-called membranous croup or pseudo-diphtheritic laryngitis in children, in whom the Klebs-Lœffler bacillus was not discovered, were caused by Vincent's angina involving the larynx. In other words, the fusiform bacillus must be considered in a differential diagnosis of membranous croup or laryngitis. Vincent's angina of the tonsils is usually not a grave disease, but the same disease invading the larynx, causing a false membrane, becomes immediately a menace to life, particularly in young children. In such a case it is interesting to note that Watson Williams, in his book on "Diseases of the Respiratory Tract," published eleven years ago, shows a cast of

the trachea and bronchus expectorated by a child at the Bristol Infirmary, in which Klebs-Loeffler bacilli were absent, but the Vincent's organism, spirillae and spirochetes were present, and were the cause of the false membrane. Rothwell[6] has reported several cases of bronchitis in which the infective organism was the fusiform bacillus. Among other causes of fatalities in this disease, have been three deaths reported by Bruce, one due to toxic absorption from the local lesion, and two to suppurative broncho-pneumonia following laryngeal involvement. Pneumonia was the cause of death in DeCarli's case. In Gilberti's case, osteo-myelitis of the lower jaw following an ulcero-membranous stomatitis and angina, caused death. Meyer reports a case of pernicious anemia, disposing to an infection of Vincent's angina, and terminating fatally. The writer has recently seen a case somewhat similar to this last, also terminating fatally, and reports it briefly as follows:

Miss M., single; aged 33; domestic, was admitted to the medical service of St. Joseph's Hospital on August 30, 1911. Two days before admission had a fainting spell. She was very weak, semiconscious, hard to arouse into conversation, complained of being very tired and wanting to sleep, no appetite, and with a great deal of aching of the bones. Heart and lungs were normal, liver and spleen normal. Tongue dry, red and glazed, gums and mucous surfaces of the lips covered with a thin, pseudo-membranous exudate. Teeth poor and dirty. Skin dry and of a lemon-yellow color. Peculiar odor about the body. Blood examination: hemoglobin, 60 plus; color index, 75; erythrocytes, 3,420,000; leucocytes 4,200. Urine pale, 1020 acid; no albumen, no sugar. Respiration 18; pulse 66; temperature 98° F. She gave a history of not menstruating for ten years, i. e., since 23 years old, but of attacks of epistaxis every month or two. Moro test negative. There was a history of syphilis, dating back ten years. During the first eight days after admission the patient was restless, more or less listless, without appetite, refusing food some of the time, sleeping a great deal, and complaining much of difficulty in swallowing. Temperature varied from 98° F. to 98.4° F. Pulse from 66 to 100, and respiration about 22. She was given strychnia, peptomangan, and Baer's sedative. She went on in this condition, steadily growing weaker and losing weight, with involuntary stools, no appetite, finally taking no nourishment whatever. On September 11, thirteen days after admission, I was asked to see her because of the difficulty in swallowing, foul odor of the breath, and ulceration of the gums. I found her greatly emaciated, anemic, skin dry and lemon tint,

difficult to arouse, breath very fetid. Resisted all efforts to use a tongue-depressor or open the mouth, complaining of great pain. On examination there was very extensive stomatitis, involving the alveolar and buccal mucous membranes, which were swollen and covered with a dirty, yellow-gray, friable pseudo-membrane. The gums about the dental margins were swollen and bled easily. Tongue covered with yellowish exudate. Unable to get satisfactory view of the tonsils or pharynx; submaxillary glands enlarged. I made a tentative diagnosis of Vincent's angina, prescribed orthoform powder for relief of pain, tincture iodin locally, and a wash of permanganate of potassium. A smear was made at the same time from a gentle curetting of the alveolar pseudo-membrane, and was submitted to Dr. Meader for examination. His report was positive for the fusiform bacillus and spirilla of the Vincent's angina. A blood examination was also made, and showed hemoglobin, 60 plus; color-index, 1.2; erythrocytes, 2,624,000; leucocytes, 6,800. The patient continued to grow weaker, became delirious, and died two days later. An autopsy by Dr. Weiskotten showed a chronic interstitial nephritis, arterio-sclerosis of abdominal and thoracic aorta, arterio-sclerotic endocarditis of the mitral valve, a bilateral chronic salpingitis, edema of the brain, ulceration of the mouth, larynx, trachea, and esophagus without lesions. Bacteriological examination from smears from ulcers in mouth made before death was fusiform bacillus and spirochetes of Vincent's angina.

Treatment is satisfactory in the mild cases, most unsatisfactory in the serious ones accompanied by toxemia, prostration, and mechanical obstruction to breathing. In the mild cases, those in which the ulcer resembles syphilitic lesions, the writer has derived best results from the use of trichloracetic acid. The membrane is first removed by peroxid of hydrogen, and wiping off with cotton swab. A 10 per cent solution of cocain anesthetises the ulcer, after which in a few minutes trichloracetic acid is applied. Three or four applications, at intervals of two or three days, are sufficient,—sometimes but one. Tincture of iodin, in the writer's experience, is not so efficacious as the trichloracetic acid, but in an extensive ulceration involving much surface, it would be preferable. Orthoform relieves the pain. The teeth must be cared for, and no progress will be made so long as carious teeth, and ulcerations around them, remain. The general condition of the patient must be improved. In the more serious cases, such as the two reported in this paper, local treatment is not satisfactory. It is hoped that a specific anti-

toxin may yet be produced, or possibly salvarsan might be efficacious against this spirochete as it is against that of syphilis, and the writer intends employing it in the next serious case unless something better is found.

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Critical Study of the Relation Between Nose and Sexual Organs. SEIFERT, *Ztschr. f. Laryngol., Rhinol. u. ihre Grenzgeb.*, Band 5, Heft 3, 1912, p. 431.

After a critical review of the literature and a number of experiments of his own, the writer arrives at the following conclusions: (1) Many symptoms point to a direct nerve connection between nose and sexual organs. The course of the respective nerve-tract is as yet unknown. There exist certain striking anatomic and physiologic analogies between several parts of the nose and the sexual organs; (2) the objective noticeable nasal symptoms accompanying sexual conditions and functions, seem to be influenced to a more or less pronounced degree by general circulatory and mechanical conditions; (3) numerous pathologic conditions (including many menstrual anomalies and also quite often the hyperemesis gravidarum), may be explained by the assumption of a real nasal reflex neurosis or of a previously existing nasal intumescence with its local and general sequelae; (4) the active nasal influence upon the sexual organs may be chiefly explained by the suggestive effect of the therapy, as the euphoria of cocain that varies in different individuals and the relief of the nasal conditions causing nasal reflex neurosis; this apparent nasal influence is furthermore due to the establishment of free nasal breathing and the alleviation of nasal engorgement.

GLOGAU.

THE RELATION OF DIETETIC ERRORS TO DISTURBANCES OF THE UPPER RESPIRATORY TRACT.*

BY EDWARD W. COLLINS, M. D., DENVER,

In presenting this paper it is rather more my purpose to relate personal observations and experiences, than to attempt to deal exhaustively with the subject from the standpoint of its chemistry, pathology, literature, history, etc. Particularly do I wish to consider it with relation to the effect of the digestion of the carbohydrates, and acid fruits upon the membranes with which we have to deal. Although my clinical experience may differ materially from that of many of those present yet, inasmuch as it has been through the free and critical discussion of clinical experiences in the past that many obscure etiological factors have been brought to light, I present the facts here gathered for what they are worth, with the hopes that something new along these very puzzling lines may be developed.

In searching the text-books at my disposal I find very meager allusions to the subject of diet and its therapeutic application to the treatment of diseases of the upper respiratory tract.

Those men who have worked along any particular dietetic theory have often been accused of being unreasonably prejudiced in favor of their hobbies, and of bridging chasms logically, pathologically and chemically to fit their theories but so have others in all lines of medical research; and while the subject is an extremely complex one, it is within the province of all of us, by careful observation, to occasionally add a link here and there with which to bind together clinically, the physiological and physio-chemical theories, which are emanating from our laboratories, where, after all, the ultimate work upon the subject of digestive phenomena will be accomplished.

As yet we all feel that we are far from the solution of the problem, yet every year brings us nearer to the goal for which we are striving.

I now present the following for your consideration, not as a new problem, but simply as a slightly neglected one, and one which, if

*Read at the joint meeting of the Western Section of the American Laryngological, Rhinological and Otological Society, and the Colorado Oto-Laryngological Society, March 30, 1912.

properly solved, will make the field of rhino-laryngology a more useful one to our patients and to those of our confreres who, from time to time look to us for assistance in clearing up some local condition apparently within our scope.

As Arrowsmith has so aptly observed: "From time to time it harms none of us to be reminded that there are other worlds outside the orbits of our own, and to pause for a while and learn what is happening in circles beyond our own immediate sphere of activity."

Inasmuch as an extremely close inter-relation exists between all structures of an organism, and inasmuch as the pharynx itself may be considered a part, not only of the upper respiratory tract, but also of the digestive tract, and as pathological conditions may extend by continuity of structure, as well as through the general circulation, we must admit that the field of the rhino-laryngologist is closely related to that of the dietitian.

Shortly after entering the field of rhino-laryngology my attention was first called to the effects of certain articles of diet upon pharyngeal conditions. I had at that time under my care a patient who suffered rather frequently from mild attacks of simple, granular pharyngitis. At the time I was seeing him he was likewise suffering from a distressing vertigo, so distressing in fact that scarcely five consecutive minutes would elapse without an attack of more or less severity.

His condition in the matter of his vertigo had been getting progressively worse for ten months, until he fortunately came under the care of Dr. W. H. Bergtold of this city, who, upon the theory that he was suffering from perverted metabolism, restricted him to a diet of proteids and non-starchy vegetables, eliminating such articles as potatoes, peas, beans, and the acid fruits, and sharply reducing all other of his carbo-hydrate food. Without further therapeutic measures the individual recovered not only from his vertigo, but likewise noticed that he ceased to suffer from his frequent and troublesome pharyngitis. He has been under close observation since that time, and invariably finds that a few days of dietary indiscretions along the lines mentioned result in a return of the pharyngeal trouble.

Since then I have been more and more impressed with the concurrence of pathological conditions in the upper respiratory tract, and the inability of the gastro-intestinal tract to properly digest and assimilate certain of the carbo-hydrates.

My interest in the subject has, at all times, been stimulated by the clinical work and results of Dr. Bergtold from the view-point of the internist, and by the valuable suggestions which he has offered along the lines of carbo-hydrate digestion, which have made my own results in many instances more satisfactory.

We all are at this time willing to admit that improper oxidation of these bodies will go so far as to produce diarrhea, constipation, furred, tooth-marked tongue, and to increase asthmatic and bronchial conditions, and most of us I am sure, are convinced that this same etiological factor obtains in many of the diseased conditions with which we have to deal.

In our clinical experience, how often do we have presented to us symptoms referable to the pharynx, naso-pharynx, or oro-pharynx as follows: A feeling of constriction about the throat, difficulty in swallowing or breathing, pain referable to any area from the mid-tracheal region to the angle of the jaw, more or less discharge, and a desire to raise or clear the throat with very little secretion to reward the individual for his efforts, and of more discomfort produced in the act of swallowing saliva, for instance, than in swallowing a large bolus of food. Often these symptoms are associated with more or less indefinite joint-pains.

Upon examination, the picture presented may be one of an anatomically perfect throat with the mucous membrane pale or perhaps congested and thickened, with here and there enlarged lymph-nodes standing out discretely or a coalescence of several, forming an area the size of a pea, usually near the posterior pillars. Such pictures are common to all of us in a more or less modified form, and for lack of a better name we call it a rheumatic throat, order salycilates, and in the majority of cases the individual responds promptly and is relieved for the time being of his ailments.

We are, unfortunately, reaching the time when the term rheumatic is being applied only to that ancient affection known as rheumatic fever; a limitation it should have had forced upon it several decades ago. Certainly we have no true rheumatic condition to deal with in the above-mentioned set of symptoms.

Upon questioning these patients as to their manner of living, we usually find that they are people of more or less sedentary habits, high livers and likewise consumers of large quantities of heavy starches or acid fruits. Usually potatoes, peas, beans, rice and the white breads form a prominent part in an otherwise equally liberal diet.

Recently I saw a young woman complaining in rather marked degree of practically all of the above-mentioned symptoms. I learned that she was very fearful as to whether or not she was tubercular, as her husband was supposedly suffering from a tubercular throat.

Upon examination I found a typical granular pharyngitis, which I treated locally, and then gave her a prescription for salycilates with instructions to deny herself the starches, stimulate elimination, and report at the end of four days. At the end of that time she presented herself greatly improved, accompanied by her husband, who was supposed to have been tubercular, and who was suffering from the same symptoms as his wife but in a much more aggravated form. He had, in fact, been taking daily treatments, from some quack concern, for supposed tubercular ulcers of the throat.

Upon examination, his throat showed the usual signs of follicular pharyngitis. He stated that his occupation was that of a driver for a fruit commission house, and that it was his custom to eat large quantities of fruit every day, and likewise to carry home large amounts, that had to be consumed immediately. I therefore took his wife off of the salycilates and put both patients on a diet consisting principally of meat, milk, and the non-starchy vegetables. At the end of ten days they were entirely relieved of their distressing throat-symptoms, and remained so for a period of several months, at the end of which time I lost track of them. These patients presented rather unusually severe symptoms, and therefore were rather striking in their recovery through simple dietetic measures.

During the past month I have had under my care a young woman from California, whose condition was very similar to these two, and in which the etiology, treatment, and results were practically the same. These three patients represent a type of case which we are meeting often and in which the question of diet is likely to be overlooked.

The same etiological factors likewise bear a direct relation to certain conditions of the nose and middle-ear. As Stucky has so aptly observed: "The toxins, owing to disturbed body chemistry, are manufactured daily in the intestinal canal and remain in the system. The result is a protest from the irritated nerves and poisoned cells, manifested in rheumatic pains, asthmatic attacks, vertigo, obscure neuroses of the eye, ear, nose and throat, neuralgia and periodic headaches, all these being evidence of systemic poisoning."

In my experience these toxins seem to manifest themselves more markedly after excesses in the heavy starches and acid fruits than

among those living upon a diet of the proteids and fresh vegetables with a limited amount of carbo-hydrates.

Usually in these cases the urinalysis shows large amounts of uric acid, acid urates, is of a high color and specific gravity, and is apt to be scant. In this connection a recent article by J. H. Long, of Chicago, confirms the influence of a carbo-hydrate diet upon the percentages of uric acid nitrogen in the urine. He found by experimenting upon one of his students for two periods of about ten days each, that during the period in which the subject subsisted upon a diet poor in protein with more fat and carbo-hydrates, that the uric acid nitrogen increased from 1.74 per cent to 2.06 per cent.

We have all seen marked deformities in the nose, especially those involving the septum in which the possessor suffers practically no inconvenience aside from the consciousness of his unequal breathing-space, while the same or a less marked condition in another will precipitate repeated and severe attacks of coryza to such an extent that life is hardly worth the living, due probably to the fact that a condition of perverted metabolism exists in the latter. Many, I might say the majority, of the cases of hay-fever that I have seen, occur in individuals with very little intra-nasal deformity, and the same is true in a certain per cent of the patients who consult me every few months with an acute rhinitis.

However, we can all testify to the practically uniform results obtained in the relief of recurrent attacks of acute rhinitis among the patients in whom deformities exist, by means of plastic work, and while a certain per cent of them continue to "take cold," their attacks are less severe, the discomfort is much diminished, and the predisposition to sinus complications less marked. It is probable that the later class are also suffering from lithemic tendencies, the gastro-intestinal toxemias being the precipitating factor in producing their nasal trouble. Tinnitus and middle-ear deafness in my experience are also commonly influenced by carbo-hydrate debauches.

Please do not understand me to believe that all cases are necessarily effected by this diet, nor that all individuals without marked malformations who suffer from recurrent attacks involving the upper-air passages, are necessarily partaking of an excess of carbo-hydrates. On the contrary, I am willing and glad to confess that often the personal histories and habits of the cases coming under my observation fail to confirm to the carbo-hydrate theory. And we must realize that even among that class of people leading sedentary lives, the carbo-hydrates may form a prominent part in the diet

without causing distress. Constitutional peculiarity, manifested either as an idiosyncracy on the one hand, or immunity on the other, must be borne in mind. Certain it is that an excess of food of all kinds is partaken of by most of us without marked distress.

Likewise the experiences of different investigators, men who have abundant clinical material at their disposal, differ materially in the matter of quantity and kind of food which apparently causes these so-called lithemic explosions.

To those of us who are living and working in Colorado, the work of M. A. Durig, in the matter of altitude, might be of interest. He says, in *Le Semain Medical*, March 29, 1911, that "Altitude provokes an increase of oxidation and retention of nitrogen in the organism. One often observes insomnia and headaches. It works up to a certain height as a stimulant, above that it provokes trouble, and great altitude can even cause death." Inasmuch as our subject has to do more or less with the oxidation and sub-oxidation of food ingested, might it not be well to remember the matter of altitude in certain of our cases here.

E. C. Kirk, D. D. S., whom Allyn quotes in his very able article "On the relation between diseases of the mouth and systemic diseases," believes that certain cases of erosion of the teeth are dependent upon the lithemic condition, and states that "by sharply reducing the carbo-hydrates he soon has the mouth in an alkalin condition, dental erosion ceases and there is a corresponding disappearance of all arthritic symptoms;" believing that while the proteids are not so easily oxidized as the carbo-hydrates, that the latter seize upon the available oxygen and leave a wholly inadequate amount for the oxidation and elimination of the former. In his experience, if the carbo-hydrates are greatly reduced metabolism rights itself.

Deeks, who has done admirable work along these lines, holds that it is not only the starchy vegetables, such as potatoes, yams, etc., that are responsible for these metabolic conditions, but that sugars are also largely responsible for much human suffering. He compares the sugar- and candy-curse to that of alcoholic intemperance, and awards the decision in favor of the latter. It has been his experience in the matter of fruit acids that they are antiseptic and well tolerated by those who are not sugar eaters.

As to this I am not prepared to say from my own experience, but in the future will watch with interest the effect of this combination. Possibly in the cases referred to earlier in this paper the individuals had likewise been taking large amounts of sugar. I did

not question them in this respect. Certainly the reports of Deeks are interesting and among the best which have been written upon the question of carbo-hydrate digestion.

It is possible that in the ennervating climate of the tropics, sugar and starch fermentation is greater than at this altitude and latitude, and that the relaxed and atonic mucous membranes of individuals in the Canal Zone are more susceptible, especially when associated with the marked anemias occurring there. In support of his contentions, he cites the case of a child, invalidated from exceedingly severe recurring attacks of pharyngitis, tracheitis and bronchitis to such an extent (climate being presumably the exciting factor) that peremptory orders by physicians of repute had been issued for a Northern sojourn. The case cleared up permanently with two weeks treatment. Fresh vegetables, milk, meat and fruits comprise a large proportion of the diet of those under his care. He has the further advantage of having carried on his research in Montreal and New York City, as well as in the Canal Zone, and announces that the results in the latter place fully confirm those obtained in the two former.

Arrowsmith, while not attacking specifically any articles of diet but dealing with the subject more generally, observes that "we can state as an axiom that the non-specific acute inflammations of the nose and throat and the phenomena of taking cold are never due to exposure and never occur unless the patient is in a condition of perverted metabolism. The patients who consult us for these disturbances are almost invariably over-clad, over-fed, under-exercised, and under-aerated," an opinion with which the majority of us can, I am sure, unreservedly concur.

What the variety of perverted metabolism is, with what kind of food we are over-fed, or just what cell or set of cells are at fault, will scarcely be determined in a manner that can be applied to all cases. There will always remain abundant opportunity for interesting study of our individual patients. In the meantime it behooves us to continue to perfect our technic in the matter of local treatment and operative work, and to bear in mind that we have abundant need, from time to time, of the internist, the neurologist, the dietitian and the laboratory expert and that frequent consultation in no way detracts from the brilliancy of our own attainments.

To summarize, we have the following matters to consider:

1. That beyond doubt the use of carbo-hydrates and acid fruit in certain cases will cause marked disturbances in the upper respiratory tract.

2. That in certain cases the acid fruits when not combined with sugar may be well tolerated and beneficial.

3. That there is a close inter-relation between all cells of an organism and that functional disturbances of any kind, including those of the upper respiratory tract may result from gastro-intestinal toxemias.

4. That certain constitutional peculiarities exist in all patients and that the existence of these must determine largely the variety and quantity of food to be taken by such individuals. Likewise that the manner of living, and place, with special reference to latitude and altitude should be regarded as possible etiological factors in producing some of these disturbances.

5. That no two of us are likely to have identical experiences in the matter of applying dietetics to the treatment of disease.

6. And lastly, that we, as rhino-laryngologists, are not an isolated body of practitioners except as we make ourselves so, but that, as in the human organism, so in the medical fraternity, an extremely close interdependence exists between its different members, and that by consistent co-operation of these members the best results will be obtained for all concerned.

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EDITORIAL DEPARTMENT

THE DEAF

Their Education—Improvement of Conditions—Responsibilities and Participation of the Profession.

EDITED BY

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NEW YORK CITY

The aim of this department of THE LARYNGOSCOPE will be to bring to the notice of its readers from month to month, facts that may be helpful to physician and patient in dealing with the life-problems involved in deafness. Suggestions from readers will be gladly received and all questions answered to the best of our ability.

"Through isolation, silence, darkness I send forth a winged word. The spoken word—that mighty, thought-quickening power flung back the gates and gave me a wider access to the world of knowledge and companion ship.

Helen Keller, before the American Association to Promote the Teaching of Speech to the Deaf. Providence, R. I., June 27, 1912.

From June 25 to July 2, in Providence, R. I., some three hundred members of the American Association to Promote the Teaching of Speech to the Deaf, met to discuss the problems connected with the oral education of the deaf. Dr. Alexander Graham Bell, by whom the Association was founded and endowed, was present throughout the meeting and spoke on several occasions concerning the system of visible speech symbols invented by his father, Alexander Melville Bell. Dr. John Clarence Blake, of Boston, addressed the Association on the "Importance of stated aural examinations in the schools for the deaf." Dr. Blake emphasized the great value to the deaf of even slight "islands" of sound perception and cited instances where remarkable results had been obtained by training and developing the perception of sound in detached sections of the tone scale, where hearing had been destroyed through the greater part of the normal range. Neither the educators, nor the otologists, as a class, sufficiently understand the importance of even the smallest remnant of hearing in developing the intellect, and especially the speech and language powers of the deaf.

I have preached this and practiced it for many years in my school, and was delighted to have my views fully corroborated by so eminent an authority.

Dr. Holmes, of the University of Pennsylvania, gave an inspiring address on the "Psychology of Childhood." Mr. Carl R. Byoir spoke on the Montessori Method, which is of special interest to the teachers of the deaf because, in essence, it has been used by them for many years before Montessori's name was ever heard.

It was my privilege to have as my guest at this meeting, my former pupil and devoted friend, Miss Helen Keller, and her life-long companion and teacher, Mrs. Annie Sullivan Macy. At one of the sessions, Miss Keller addressed the Association, speaking without any interpreter. The official stenographer was able to record her speech verbatim, although he had never seen her before. She said in part: "I remember well the bright June day that I spoke before you sixteen years ago. That day I used my defective, halting voice to urge that every deaf child should be taught to speak. To-day my voice is still defective and halting, but I lift it, imperfect as it is, in praise of the work of your Association. Your progress rejoices me, and such progress as I have made is valuable to me, because it reinforces and proves your work. It has always been a joy to be able to speak. True, it is poor speech. Nevertheless, what speech I have has meant more to me than I can ever say. My words are lame and broken, but they bind me to the world of men and women. Through isolation, silence, darkness I send forth a winged word. Its pinions are crippled, but somehow it flies and reaches another heart. With the first word that unloosened my tongue began a greater fullness of life. Before that I had been happy when a flutter of the fingers opened to me a small part of the world I was exploring. But the spoken word—that mighty, thought-quickening power—flung back the gates and gave me a wider access to the world of knowledge and companionship. I wish this Association God speed in its endeavors to open the lips of the deaf. Every time I open my mouth I shall think to myself, 'I must speak well. I will speak well,' for my success will encourage you to go forward touching silent lips and setting free, mute voices."

On August 16, the International Otological Congress, in session in Boston, for the first time in the history of that organization, included in its programme the discussion of the educational problem of the deaf. This action was due largely to the active interest taken in the subject by Dr. Goldstein, the Editor of THE LARYNGOSCOPE. The Congress did me the honor of asking me, although a layman,

to address them and demonstrate the results of the oral instruction of the totally, congenitally deaf. It was a pleasure and a privilege to accept this invitation, for that distinguished body of specialists can, if they will, exert a tremendous influence throughout the world on behalf of extending to *all* the deaf the benefits of a *purely oral environment* during the educational period, which at present comparatively few enjoy. It cannot be repeated too often in these columns that the best general results in practical and successful speech- and lip-reading cannot be expected from the so-called "combined" schools, where a purely oral environment does not exist. As the medical profession becomes more intelligent on the subject of the education of the deaf, and has a better understanding of what can be accomplished under proper and perfectly feasible conditions they will exert their great influence in behalf of legislation, backed by adequate appropriations, for the necessary purely oral environment, to the exclusion, during the educational period, of all forms of manual communication.

Through the courtesy of the friends and parents of three of my pupils it was possible for me to present to the Congress, Miss Mabel M. Johns, of New York City, Master Charles Henry Over, of New York City, and Miss Helen Keller, of Wrentham, Mass.

Miss Johns, now a young lady, was my pupil for ten years. She is totally and congenitally deaf. Master Charles Henry Over is a lad of 15, still in school. He was made totally deaf by spinal meningitis at 2 years of age.

Miss Keller was my pupil for a period during her early educational life. She was made totally deaf and blind by severe congestion of the stomach and brain at nineteen months. The history of her early instruction by Miss Sullivan, and her ultimate graduation from Harvard College, is too well known to need repetition here.

During the preliminary reading of most interesting and valuable papers by Dr. Hudson-Makuen and Dr. Goldstein, which will appear elsewhere in THE LARYNGOSCOPE, and the announcements and transaction of business by the President, Dr. Blake, I was able to keep my three deaf pupils in perfect understanding of what was said and done by repeating the speeches to them, but without voice, in order not to disturb the speakers, while at the same time I spelled into the hand of Miss Keller. Miss Keller can read the lips by touching them with her fingers, but it is necessary to speak with voice in order to that she may do this, which, of course, was not possible during the meeting.

Miss Johns addressed the Congress in English, then spoke briefly to the foreign members in German, French and Italian. She said in part: "As I realize how great a boon speech- and lip-reading have been to me, I am eager to speak to you on behalf of the deaf who are less fortunate than I to beg that you will use your powerful influence to give all the deaf the same opportunity of mingling with the hearing world.

"If the deaf, as a class, are different from the hearing, it is largely because they are made so by the manner of their education. The use of signs and the manual alphabet isolates them and sets them in a class apart to a degree wholly unnecessary. Every normal deaf child can, and should be taught speech, and should be taught to make speech not an ornamental accomplishment, but its natural means of communicating with his fellows. This can only be done successfully by giving him purely oral instruction from his earliest childhood for at least ten years.

"To accomplish this requires, of course, a larger proportion of teachers to pupils in our schools, and a higher standard of preparation for the teachers. This again means larger appropriations from the public purse, but never would money be better expended.

"As for myself, I do not hear a single sound, having been totally deaf since infancy, but my life has been passed wholly among hearing people, with whom I have always communicated by means of speech and lip-reading. I find the same enjoyment in books, art, the theater and social gatherings that you do, and my life is rich and full of varied interests.

"Since every child is very early taken to some member of your profession, I earnestly beg of you not to limit your interest in him to a purely professional basis, but to advise the parents as to what can and should be done for the child educationally, urging them to spare no effort to have him taught to speak and to place him as far as possible in the same environment as their hearing children."

Master Over carried on an extended impromptu conversation with me, and demonstrated the use of my auto-inspection laryngoscope, drawing on the blackboard diagrams to indicate what he saw in his own larynx while uttering sounds of varying pitch.

Miss Keller spoke in English, German and French. She said in part: "This is a new day in the education of the deaf—the day when the physician is no longer content to fight the hostile silences with medicine and surgical instruments alone, but helps the teacher to pour the blessed waters of speech into the desert of dumbness. * * * I am but urging you in the direction which your profession has

already taken when I ask you to look beyond the deaf ear to the deaf child, to the human being whose problem it is to recover, despite deafness, his golden birthright of spoken words. You will look behind the closed doors of sense and see the impatient spirit waiting to be set free. It will become your painful duty to tell the parents that their child will never hear. Resist the tendency—some physicians call it humane, I call it barbarous—of leaving the patient in hope of ultimate recovery when you know that it is impossible. I have heard of doctors who continued to prescribe useless remedies such as electricity and osteopathy, and even Christian Science, when they knew that there was no hope, simply because they had not the courage to tell the truth. Such kindness is expensive consolation. It would be much more to the point to prepare the unfortunate one for his fate, to help him arrange his life in anticipation of the changed conditions under which he must henceforth live. * * * The parent who brings his child to your office, to your hospitals, should find in you, not a teacher perhaps, but one who understands how far it is possible to right the disaster of deafness. * * * How splendid it will be, what new courage we shall feel if all our surgeons henceforth use their influence to secure for every child the opportunity to speak. The deaf and the teachers of the deaf need your help, and I am sure that you will help them in all the countries of the world from this day forth."

Mr. Charles A. White, head of the vocal department of the New England Conservatory of Music, also very kindly consented to illustrate some of the exercises he has successfully employed of late to improve and strengthen Miss Keller's voice. Under his direction, Miss Keller went through with vocal exercises for increasing resonance, ease of voice production, and the various rhythms of spoken utterance, such as "glottis closure," "breathy tension," and the scales of the English vowels in different musical rhythms. Many of these exercises are the same that he employs with his pupils in singing, and this led the daily papers to make the absurd announcement that Miss Keller is learning to sing. He also showed the remarkably accurate perception of pitch which Miss Keller possesses through the muscular and tactile senses alone, and stated that, in his opinion, if she had her hearing she would have the rare gift of "positive pitch."

Mr. White showed himself a master of vocal physiology, and received hearty applause from the members of the Congress.

Miss Martha Bruhn, of Boston, a teacher of lip-reading to adults, who is herself deaf and an expert lip-reader, presented two of her

pupils. Miss Bruhn employs a method devised by Herr Mueller-Walle, of Germany. She illustrated her system of syllabic drill, and asked one of her normal students, who has been taking the course for the purpose of teaching, to tell an anecdote to one of the pupils. The pupil was not familiar with the speech of the pupil-teacher, but was able to get the greater part of the anecdote, as was evident by her reply to subsequent questions asked by Miss Bruhn. One of the pupils was only slightly hard of hearing, and, in order that only lip-reading should be employed in the exercises, Miss Bruhn spoke in a whisper which was not audible throughout the ampitheater. The audience thus found themselves unable to understand what was perfectly intelligible to the pupil.

But interesting as the formal session was, perhaps the best illustration of the practical success of the oral education of the deaf was given in the evening, when the young people were the guests of the Congress at an informal dinner and entertainment on the roof garden of the Westminster Hotel. Here there could be nothing prepared beforehand, and the joyous, exuberant way in which these deaf young people entered into the social pleasures of the evening was a revelation to many an otologist. They met the doctors as naturally as though they had all the advantages of any other young people. They spoke German with the Germans, French with the Frenchmen and English with the Americans and Englishmen. They danced and chatted, and laughed, till it was evident that they were having a truly glorious time. It was a veritable ovation for them and they will remember the jollity of that evening all their lives, thanks to the courtesy and kindness and interest of the fine body of men who composed the Congress. And they "preached the gospel," too. The first question they put to each new man who was introduced was, "are you interested in the education of the deaf?" Each one was urged to use all his influence to give to other deaf children the advantages they had enjoyed.

The result of this broad-minded action on the part of the Congress should be far-reaching. It is to be hoped that other gatherings of otologists will give at least a small portion of their sessions to this most important topic, and thus gradually make the profession thoroughly conversant with the subject and able to give most valuable advice to their patients.

BOOK REVIEWS.

Forschungen und Erfahrungen (1880-1910). Eine Sammlung ausgewaehlter Arbeiten. (Researches and Experiences.) Von. Prof. Dr. Sir Felix Semon, K. C. V. O., Fellow of the Royal College of Physicians, etc Two volumes. Verlag August Hirschwald, Berlin, 1912.

Under this caption the able master in laryngology, Sir Felix Semon, has recently published a selected series of his monographs and writings in two substantial octavo volumes.

This series of papers, covering the experiences of thirty years of untiring service in the interests of laryngology, reflects the keen mind of this astute observer, and presents for the first time in collective form the most important articles that have been contributed throughout his active professional and literary career.

Many of these papers have been previously published in the transactions and proceedings of philosophical and scientific societies. which are more or less inaccessible to readers in oto-laryngology.

Important among these papers is the experimental work of Horsley and the author on: "Central Motor Innervation of the Larynx;" "A Study of Abductor Tonus;" "An Address on Vocal Training." These papers and a number of others were published in special medical journals now out of print and have long since been difficult of reference.

Another feature of the inaccessible of this literature is the fact that some was published in German and some in English; therefore making a large portion beyond the reach of exclusively German or English readers.

In presenting these selected monographs in German in two volumes the author places this valuable literature at the disposal of German readers of continental Europe and of the few in America and Britain familiar with this language. We offer the plea for our American and British readers that the author may find it possible to publish this valuable series of papers in the English language as well.

The classic essay: "The Evolution of the Study of Motor Paralysis of the Larynx" which originally appeared in Virchow's Festschrift, and the various discourses on "Innervation of the Larynx" which have appeared from time to time in the *Internationales Centralblatt fuer Laryngologie* are among the most valuable of the author's monographs that have never yet been at the disposal of English readers.

Even though our investigators are unfortunately handicapped by the fact that these interesting volumes are published in German, modern laryngology is to be congratulated in this acquisition, for it places before us in compact form and chronological order the best and selected papers of the Dean of British laryngology.

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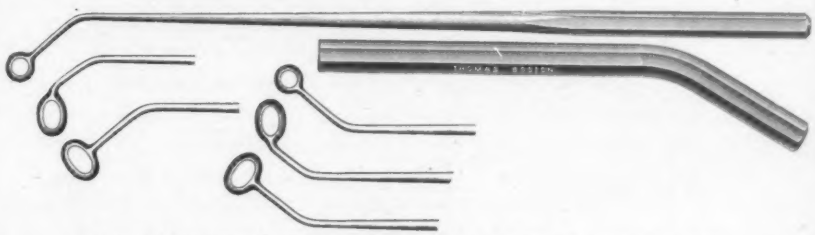

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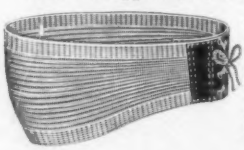

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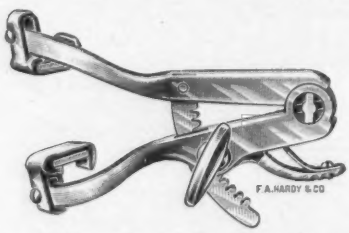

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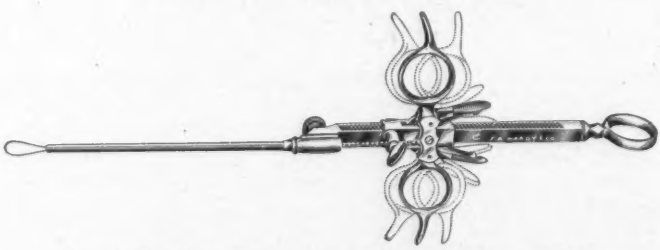

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NEWS ITEMS.

Statutes of the Lenval Prize, (Prix Lenval).

1. In 1881, Baron Leon de Lenval, at the instigation of Dr. Benni, of Warsaw, founded a prize of 3,000 francs, the income of this sum, accumulating in the interval between two International Otological Congresses, to be given to the author of the best work on the anatomy physiology or pathology of the organ of hearing, published during these three years.

2. The award of this prize is in the hands of a jury elected by the general assembly of the last International Otological Congress; the president of the Committee of Organization of the next Congress, who has been elected at the last general meeting of the congress, is also a member of the jury.

The jury is composed of nine members, who choose their president. The prize is awarded by a majority of votes. In case of a tie vote, the president decides the award.

3. On the president of the jury who has been chosen at the last congress, the duty devolves of requesting the editors of the otological journals, six months before the next congress, to publish the conditions of the competition.

4. The printed works must be sent to the president of the jury, four months before the next congress. Works presented after this date cannot compete. The president of the jury must submit the works which are received, according to their subjects, to well-known and impartial experts, for an estimate of their scientific and practical value.

The experts must return the works, with their opinions, two months before the next congress, to the president of the jury, who will distribute these expert opinions to the members of the jury ad circulandum; he may later lay them before the general meeting of the members of the jury.

5. The decision of the award of the prize requires the presence of at least five members of the jury, one being the president. In case less than five members of the jury are present at the congress, the president of the jury has the right to choose from among the members of the different countries of the congress, enough additional members of the jury to make five. In case of the ab-

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sence from the congress of the president of the jury, the president of the congress assumes the duties of the president of the jury.

The award of the prize is always decided by a majority of votes.

6. The jury has the right to divide the prize between two candidates.

7. Authors who have already received the Lenval Prize or any other prize founded for the International Otological Congress, cannot again compete for the Lenval Prize.

8. The three thousand crowns in Hungarian four per cent bonds, purchased for the sum of three thousand francs, which have hitherto been invested by the president of the jury, Professor Adam Politzer, were deposited by him, with the approval of the jury, after the International Otological Congress at Budapest, in the bank, "Egyesuelt Budapesti Takarek Penztar" under the name "Prix Lenval." The bank invests the money and remits the accrued interest, after deducting the cost of investing, four weeks before the next International Otological Congress, to the president of the jury, or on his request, to the president of the local committee of organization of this congress.

9. After the close of each International Otological Congress, the president of the jury, or later, his successor, must communicate to the bank the name of the president of the committee of organization of the following congress, as well as the place chosen for this congress.

10. These statutes must be printed as a supplement to the Proceedings of each International Otological Congress, and a copy of the statutes be deposited with the above-mentioned bank.

11. The decision of the jury as to the award of the prize must take place during the congress. The official publication of this decision is made at the last session of the congress, after which the prize is sent to the successful candidate.

Adam Politzer Prize.

1. In the year 1909, Professor A. Politzer, of Vienna, instituted a prize of 3,000 Kronen, Austrian currency, on the occasion of the Eighth International Otological Congress in Budapest. The in-

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terest of this sum which accumulates between that and the following congress is to be awarded to the author of the best work in the field of Otology published in print within the last three years.

2. The directions given in the Statutes of the Lenval Prize hold good also for the Adam Politzer Prize for the Ninth International Otological Congress in Boston.

3. The founder reserves for himself the right to send the final statute of the prize for the following congress to the President of the Organization Committee for the Tenth International Otological Congress at the given time.

4. The fund which is invested in bonds is deposited at the bank "Egyesuelt Budapesti, Takarék Pénztár."

Statutes of the Cozzolino Prize, (Prix Cozzolino).

1. The Cozzolino prize of 1,000 lire was founded by the late Professor Vincenzo Cozzolino, of Naples, on the occasion of the meeting of the Eighth International Otological Congress in Budapest, in 1909; the interest of this sum, accumulating in the interval between two International Otological Congresses, to be given to the author of the best publication on the anatomy or pathology of the organ of hearing, upon clinical therapeutics, local and general, and upon the application of electrical mechanical appliances for the treatment of lesions indicated by progressive impairment of hearing and subjective noises, published during the interval between two congresses.

2. The directions given in the Statutes of the Lenval Prize hold good, with the exception of the division of the prize, also for the Cozzolino Prize for the Ninth International Otological Congress in Boston.

The Jury consists of: Prof. Politzer, Vienna; Dr. Benni, Warsaw; Dr. Gellé, Paris; Prof. Pritchard, London; Prof. Kirchner, Wuerzburg; Prof. Grazzi, Florence; Prof. Moure, Bordeaux; Prof. Boke, Budapest; Prof. C. J. Blake, Boston.

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By John J. Kyle, B. S., M. D., Indianapolis.

Second edition, revised and enlarged, pp. 627, bound in leather, 1907, $3.00.

Manual of Diseases of the Nose, Throat and Ear.

By E. B. Gleason, M. D., LL. D., Philadelphia.

Pp. 557, profusely illustrated, bound in full limp leather, 1909, $2.50.

Principles and Practice of Modern Otology.

By John F. Barnhill, M. D., and Ernst deWolfe Wales, B. S., M. D., Indianapolis.

Pp. 575, with 305 original illustrations, many in colors, cloth, 1907, $2.50.

Operationen am Gehoerorgan.

By August Trautmann, M. D., Berlin.

Pp. 104, with 27 illustrations in the text, $1.00.

Die Krankheiten der Nase und des Nasenrachens mit besondered Berueckssichtigung der rhinologischen Propaedeutik.

By Dr. Carl Zarniko, Hamburg.

Second edition, revised and enlarged, pp. 740, with 161 illustrations and 5 plates, stiff paper cover, 1905, $2.50.

Die Krankheiten der oberen Luftwege. Aus der Praxis fuer die Praxis.

By Prof. Dr. Moritz Schmidt, Frankfurt, a. M.

Third edition, greatly revised and enlarged, pp. 955, with 182 illustrations in the text and 7 plates, cloth cover, 1903, $3.50.

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By Drs. J. Mikulitz and W. Kuemmel, Breslau.

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Les maitres de l'ecole de Paris dans la periode pre-specialistique des maladies du pharynx, duet du nez.

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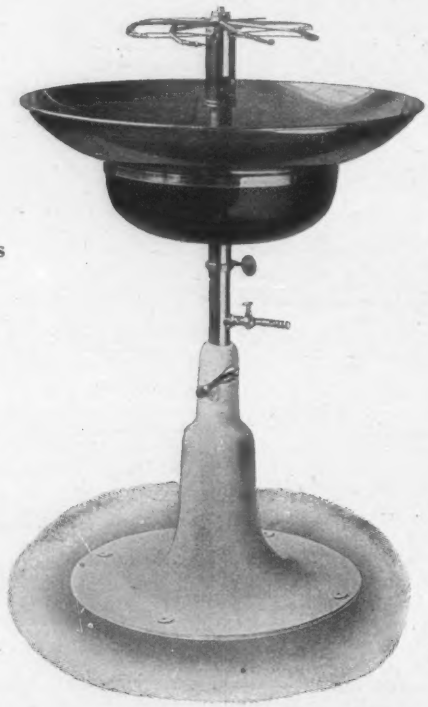

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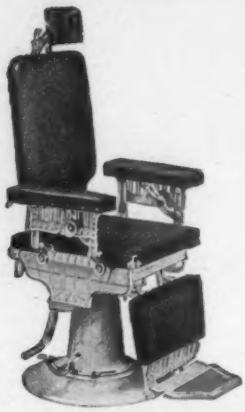

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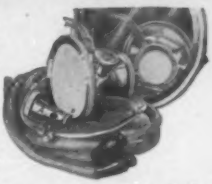

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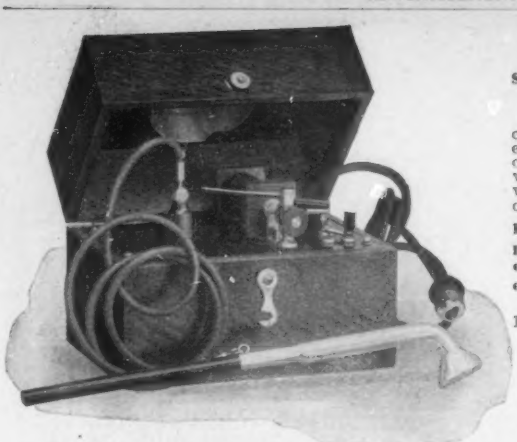

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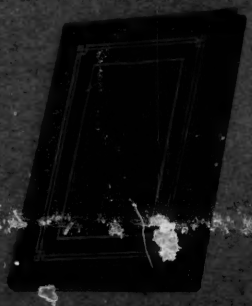

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